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SPHÆRIA CALVA TODE.

A. P. MORGAN.

SPHÆRIA CALVA: *simplex, sparsa, atra, papillata; hemisphærio superiore glabro, inferiore hispido.* Tode, Fung. Meckl.

This species was described by Tode as well as could be done at that time. It was not found by Persoon or by Albertini and Schweinitz. It was recognized by Fries; he observed that it was rare. Schweinitz records the species in the N. A. Fungi as found at Bethlehem, Pa. It appears in Saccardo's Sylloge, in the first volume as *Rosellinia calva*, in the second volume as *Lasiosphæria calva*. Berlese has not seen it. Ellis and Everhart have avoided it entirely.

I have several times found specimens which for want of a better name I have labeled Rosellinia calva (Tode). I may describe them as follows.

ROSELLINIA (CONIOCHÆTA) CALVA Tode.—Perithecia superficial, globose or ovoid, black, rough, papillate, naked above and clothed about the middle with very short black bristles. Asci cylindric, 8-sporous, the spores obliquely uniseriate, with a short stalk, 100-110 x 11-14 mic., the spores brown, oval to ellipsoid, smooth, 14-18 x 10-12 mic.

Growing on old wood of Liriodendron; Preston, O. Perithecia gregarious, close or scattered; .25-.30 mm. in diameter.

A NEW SPECIES OF SPHAEROSOMA.

FRED JAY SEAVER.

The genus *Sphærosoma* was first described by Klotzsch about the year 1840 and was then represented by one species, *Sphærosoma fuscescens*, which was described by him at that time, the exact description being given below for the purpose of comparison. Since that time two other species have been reported, *Sphærosoma ostiolatum* Tulasne, *Fungi Hypogaei,* p. 184; and *Sphærosoma fragile* Hesse. *Jahrbuecher fuer Wissenschaftliche Botanik,* published by Pringsheim, pp. 248 to 254.

CLASSIFICATION OF SPHAEROSOMA.

DISCOMYCETES.

Ascomycetous fungi with the hymenium, or fruiting surface, well exposed at maturity.

HELVELLINEÆ.

Receptacle stipitate and more or less clavate or pileate, or sessile and spreading; fleshy, waxy or rarely gelatinous. Hymenium always exposed.

RHIZINACEÆ.

Receptacle fleshy-waxy, brittle, sessile. Hymenium exposed from the first, plane or convex. Asci cylindrical, operculate. Paraphyses numerous, free.

SPHÆROSOMA KLOTZSCH.

Receptacle fleshy, sessile, convolute, roundish, outer surface covered entirely by the hymenium, within sterile. Asci cylindrical. Sporidia spherical, verrucose, hyaline.

SPHÆROSOMA ECHINULATUM Seaver n. sp. Plants gregarious or scattered, occasionally crowded, sessile, 1 to 8 mm. in diameter; at first almost spherical and regular in outline, becoming convolute with age, especially on the upper surface, often umbilicate; lower surface sterile, nearly plane, attached to the soil near the center by delicate hyphæ, very easily detached; at first white or whitish becoming reddish-brown on the exposed surface, then dark brown; the color begins with a brown spot in the center of the upper surface and spreads until it covers all of the exposed surface; at maturity having a brown velvety appearance due to the large, brownish paraphyses which extend far beyond the asci; under-surface light colored; hymenium at maturity covering the exposed surface of the plant, composed of very large asci and paraphyses; asci 40 to 50 by 300 to 500 mic., clavate, 8-spored; sporidia globose, at first smooth, filled with numerous guttulæ, and surrounded with a transparent exospore, gradually becoming rough on the outside, at maturity covered with spines which are several times as long as broad; spines 4 to 5 mic. in length by

2 to 2.5 mic. broad at the base, often bent at their apices, at maturity extending to the outer surface of the exospore; spore, excludinging exospore 25 mic. in diameter, including spines or exospore, 35 mic. in diameter; paraphyses large, clavate, septate, brownish, 12 to 15 mic. in diameter at the apex; sterile part of the receptacle composed of rather loosely interwoven hyphæ, grading into pseudo-parenchyma, cells large.

Habitat—On the surface of damp soil between the tufts of grass in an open place, in the margins of woods near Iowa City. Plants collected from June to October.

The specific name under which these plants are described is suggested by the character of the markings of the spores, which are distinctly ech. nulate.

The description and measurements given above were made from fresh material collected at different times. Specimens preserved in alcohol vary somewhat; the most of the color disappears and the plants are a little contracted and the measurements are therefore a little less.

The plants described above were collected during the later part of the month of June in the summer of 1904, in large numbers in a ravine near Iowa City and upon examination were at once referred to this genus. The individuals are at first almost spherical in form, smooth on the outer surface, and of a whitish or lead color. As they mature, a small, brown spot is formed in the center of the supper surface, the brown color gradually spreading until it covers all of the exposed surface. They are at first regular in outline, becoming, at maturity, irregularly convolute and more or less depressed, so that at maturity the plants are roundish but more or less irregular in form, of a deep brown color and with a soft velvety appearance. Examination of sections of young plants shows the brown spot on the upper surface to be the beginning of the development of the hymenial layer and the brown color and velvety appearance to be due to the large paraphyses which contain brown coloring matter.

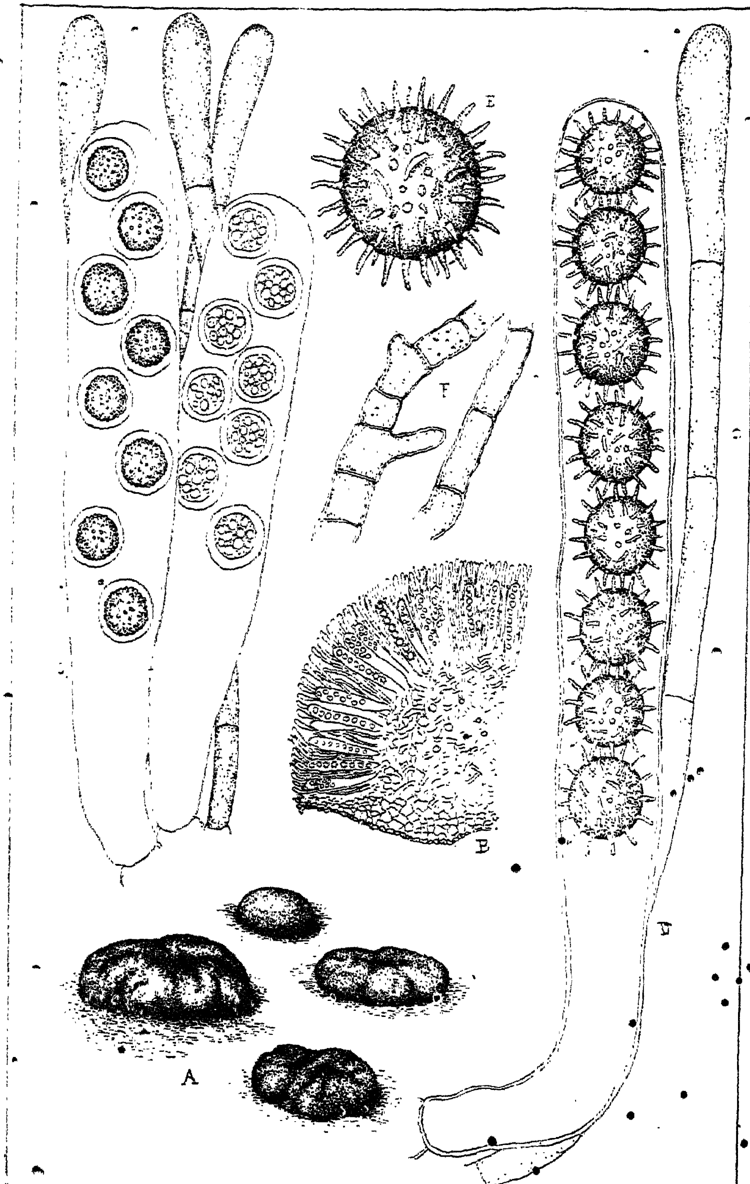
During the early stages of their development, the spores are located near the end of the ascus; they then spread out and become alternately arranged as shown in the diagram and at last are disposed in one row. They are at first smooth and filled with numerous oil drops which disappear as the spore matures and the whole body of the spore is surrounded by a transparent exospore. The first appearance of the roughenings on the outer surface occurs at the periphery of the spore proper within the exospore, the thickenings being at first very slight but gradually increasing until they reach the outer surface of the exospore. When mature a faint line may often be seen near the tips of the spines which is the boundary of the exospore but these become indistinct and in alcoholic specimens and often in mature spores of fresh material the boundary of the exospore is not visible at all, although at

an earlier stage it is very distinct. All gradations may be found between the smooth and echinulate spores, so that they are at first smooth, then verrucose and at last echinulate. The description and drawing of the verrucose markings on the surface of the spores of *Sphærosoma fuscescens* Klotzsch might be explained by the fact that they were studied while immature, but this is not likely to be the case for both mature and immature forms are present in older specimens in the same plant. Microscopic examination shows on the surface in addition to the spines markings which resemble reticulations, but these are short and not continuous and are not seen at the periphery so that they are probably only spines bent so as to give this appearance.

The relative position of the hymenium is shown in cross-section and also the relation of the asci and paraphyses and the structure of the sterile part of the receptacle. The paraphyses are seen to be relatively large and to extend some distance beyond the asci. Beneath the hymenium the interwoven hyphæ give rise to a sort of pseudo-parenchyma which is more definite near the base where the cells are smaller.

Each of the other species described is reported as occurring in woods under leaves and thus showing a tendency to become subterranean species. *Sphærosoma fragile* is described by Hesse as "ein unterirdisch-wachsender Discomycet." The plants described here vary in this respect, being found on the margin of a swampy place on the surface of rather hard, damp soil, in the shade of scattered tufts of grass, in a small ravine in the woods. They are attached to the soil by hyphæ which are so delicate that it is difficult to collect the plants without having them broken from the substratum.

These plants were collected in large numbers over a limited area and are generally more or less scattered but often several are crowded together. They were first found in this locality during the latter part of June but probably appeared much earlier than this. Frequent collections and studies were made in the field from this time until the first of October. The place was next visited in the latter part of September but at this time none of the plants could be found as the ground was covered with other forms of vegetation. Since these plants occur in such large numbers over this limited area it is likely that they will appear in the same locality during the next season, as such has often been found to be the case with other forms of Discomycetes. During the last three seasons, *Sphærospora confusa*, another Discomycete has been collected in abundance on a sandy bank, over an area limited to a few rods in diameter from spring until autumn, but has never been collected in any other locality near Iowa City so far as is known. The same has been found to be true of other species where the habitat is constant. For these reasons these plants will be expected to appear in this locality again.



SPHAEROSOMA ECHINULATUM SEAVER n. sp.

SPHÆROSPORA FUSCESCENS Klotzsch.—Dietrich; Flora Regni Borussici, Vol. VII, No 467 (1839). Receptaculo solido, sphærico, nudo, gibboso, interdum depresso, sessili; basi fibrilloso, primo extus interusque sordide-albido v. pallido-gilvo, dein fuscente; ascis immersis, clavaeformibus, hyalinis; paraphysibus verrucosis, hyalinis.

The present species is distinguished from *Sphærosoma ostiolatum* Tulasne, and *Sphærosoma fragile* Hesse, by its solid receptacle and is then more closely related to *Sphærosoma fuscescens* Klotzsch, the exact description of that species being given above for the purpose of comparison. The general description of the two species seems to be identical, except as to habitat and size of the plants. The characters which distinguish this species from the one described by Klotzsch are the size of the asci and spores and the markings on the surface of the spores. The measurements of the asci of *Sphærosoma fuscescens* as given by Engler-Prantl in "Die Natürlichen Pflanzen-Familien" are from 22 to 26 mic. in diameter and the spores 17 to 20 mic. in diameter, while the asci of the plants described here are 40 to 50 mic. in diameter and the spores 30 to 35 mic. They are also distinguished by the slender spines on the surface of the spores instead of the verrucose markings described by Klotzsch. These markings are very distinct.

In preparing this paper I am indebted to Dr. William Trelease, director of the Missouri Botanical Garden for the use of literature belonging to that institution; to Dr. Farlow of Harvard, Prof. Underwood of Columbia, and to Mr. J. B. Ellis of Newfield, N. J., for suggestions in regard to the distribution of the genus, and to Profs. Macbride and Shimek for kindly aid in preparing the work.

EXPLANATION OF PLATE.

Fig. A, Several plants at different stages in their development, x 5.

Fig. B, Portion of a section of one of the plants showing relation of hymenium, x 50.

Fig. C, Asci and paraphyses, showing two different stages in the development of the spores, x 500.

Fig. D, Mature ascus and spores with paraphysis, x 600.

Fig. E, One spore removed showing the echinulate markings on its surface, x. 1200.

Fig. F, A portion of the mycelium from the soil, x 1000.

SYDOW'S MONOGRAPHIA UREDINEARUM, WITH NOTES UPON AMERICAN SPECIES.

J. C. ARTHUR.

The laudable attempt to describe and illustrate uniformly all known species of the *Uredineae*, undertaken by P. and H. Sydow,* has progressed to the completion of the first volume. This volume contains 1226 species, all so far known under the genus *Puccinia*, and a much larger number than the size and complexity of the family would seem to warrant. But all criticism regarding the accepted boundaries of the genus may well be laid aside in view of the successful manner in which the work of describing the species has been carried out. Nevertheless, one can not help regretting that the wholly unlike, and but distantly related, genus *Uropyxis* should have been engulfed in this maelstrom of two-celled spores, after it had been so clearly shown by Magnus to be distinct. Except as part of the useful Sylloge by Saccardo, which attempted little more than to collate published accounts of the species, no systematic and uniform treatment of all known species of this large family has ever been undertaken. The present work has entailed an enormous amount of labor. In citation of literature, in collation of items regarding hosts and geographical distribution, and in verifying and unifying the diagnoses, evident care has been exercised, and a large degree of accuracy attained. Nearly half the species are illustrated with original outline drawings. The authors state that to accomplish this work they examined some 30,000 specimens. We may well believe them when they say that "wir haben mit voller Lust und Liebe an dem Werke gearbeitet"; and the reward of well merited success should be theirs.

The thirty pages of the introduction contain much descriptive, historical and statistical information. A very interesting list is given of authors of new species, with the number of species which they described each year from the time of Persoon, 1794, to the present time. In the matter of geographical distribution one is naturally surprised to find that just twice as many endemic species are credited to America as are found in Europe. One fourth of all the species inhabit the *Compositae*, and one eighth of them occur on the *Gramineae*. The six families which support the next largest number of rusts are *Umbelliferae* with 88 species, *Cyperaceae* with 53, *Liliaceae* with 47, *Labiatae* with 45, *Rubiaceae* with 38, and *Ranunculaceae* with 36.

* Sydow, P. and H.—Monographia Uredinearum seu specierum omnium ad hunc usque diem descriptio et adumbratio systematica. Volume I, Genus Puccinia, cum XLV tabulis. Lipsiæ, Fratres Borntræger, 1904. pp. xv+972. 8vo.

The arrangement of the text and indices is excellent. The illustrations are helpful, although usually confined to the teleutospores and drawn with a freer hand than seems either necessary or desirable. The serial numbering of the illustrations is bad. If each one had been given the text number of the species, it would greatly have facilitated their use.

The most notable advance, which this work shows in the grouping of the species, is their segregation according to hosts. It can not be said that this method indicates relationship, but it is a fine safeguard against the confusion of species having teleutospores of similar appearance. The Schroeterian classification, based on the number of spore-forms in the species and their behavior, was wisely discarded.

No one believes that such a work can be perfect; errors must necessarily creep in, due to many causes, even if, as in the present case, every reasonable care has been exercised by the authors to insure accuracy. The following notes upon the American species are not to be taken, therefore, as a criticism of the work, but as a contribution to the subject. Much of what is here given has been learned through recent studies, and constitutes heretofore unpublished information. The species are taken up in the order adopted in the work, and the text numbers are retained for ready reference.

No. 6. PUCCINIA CORNIGERA E. & E. should be made a synonym of *P. Actinellae* (Webb.) Syd.

No. 10. PUCCINIA LONGIPES Lagh. should be made a synonym of *P. Vernoniae* Schw. This name is founded upon an error. Schweinitz described *P. bullata* from dead stems "variarum plantarum v. c. Ambrosiae, Chenopodii" (Syn. Fung. Car. p. 74), which statement was copied by Link (in Linné, Sp. pl. 6^2:75). In his later work (Fungi of N. Amer. p. 295) Schweinitz gives the host for this species as "Vernonia novaeboracensis," a correction which Lagerheim and others seem to have overlooked. This caulicolous form of the species with its extraordinarily large sori is not infrequently collected, but almost always on dead stems, where the contrast of color makes it conspicuous. No rust has ever been found on the stems of either *Ambrosia* or *Chenopodium*.

No. 13. PUCCINIA APLOPAPPI Syd. is a synonym of *P. tuberculans* E. & E. The differences noted by the author are only the natural variation of the species, due to changed environment.

No. 17. PUCCINIA SIMILIS E. & E. is a synonym of *P. Absinthii* DC. The aecidia described are undoubtedly a part of the species. No aecidia are described under *P. Absinthii*, although this stage belongs to the species.

No. 19. PUCCINIA RECONDITA D. & H. belongs under *P. conferta* D. & H. This species is also found in Washington, New Mexico and Oklahoma.

No. 26. PUCCINIA MAGNOECIA E. & E. The only character that definitely separates this species from *P. Asteris* Duby is the large sorus, and even this sometimes shows all gradations to the small sorus. The type of the species which is in the herbarium of the N. Y. Botanical Garden has recently been examined at my request by Dr. Rydberg and Professor Earle, and is found to be *Aster Cusickii* A. Gr., not *A. pulchellus*, as heretofore supposed. The form with large sorus is found upon other species of aster, however, and is essentially the same in appearance as *P. Gerardii* Pk., which is no longer maintained as a separate species. It can not be foretold what cultures, and more extended study, may develop, but at present there seems to be no good reason for maintaining the forms with large sori as separate species.

No. 62. PUCCINIA CYANI (Schleich.) Pass. has recently been found in the United States by Charles H. Peck at Menands, N. Y. (see Rep. N. Y. St. Mus. for 1903:25).

No. 49. PUCCINIA CICHORII (DC.) Bell. was found at Burlington, Vt., Aug. 11, 1898, by T. E. Hazen, and at Oaks Corners, N. Y., Sept. 16, 1904, by H. S. Jackson.

No. 76. PUCCINIA ENDIVIAE Pass. was reported from this country last year, having been collected at Hamden, Ct., Oct. 14, 1903, by G. P. Clinton (Rep. Conn Exper. Sta. for 1903:321).

No. 80. PUCCINIA INCLUSA Syd. is a synonym of *P. Cirsii* Lasch, without any doubt, as in fact the authors indicate in the appendix.

No. 82. PUCCINIA CALIFORNICA Diet. is also a synonym of the variable species *P. Cirsii* Lasch.

No. 122. PUCCINIA CONFLUENS Syd. is but an incidental variation of *P. Erigerontis* E. & E. The species has also been collected on *Erigeron Eatoni* at Laramie Hills, Wyo., Aug. 8, 1901, by Aven Nelson, and on *E. microlonchus* at Willow Creek, Wyo., July 1, 1898, by Elias Nelson.

No. 141. PUCCINIA GUTIERREZIAE E. & E. is a synonym of *P. Grindeliae* Pk.

No. 173. PUCCINIA LAGOPHYLLAE D. & H. should be made a synonym of *P. Hemizoniae* E. & T.

No. 197. PUCCINIA NARDOSMIAE E. & E. appears to be a synonym of *P. conglomerata* (Str.) K. & S. The host genus is very closely related to *Homogyne*, on which the European rust has been collected, and the fungus from the two countries does not appear to differ.

No. 231. PUCCINIA EXPANSA Lk. This species has not yet been found in America. The collection on *Senecio lugens* from California (Sydow, Ured. No. 782) referred to under this species belongs to *P. subcircinata* E. & E.

No. 241. PUCCINIA TRACYI Sacc. & Syd. is undoubtedly a synonym of *P. Solidaginis* Pk. The differences in appearance of the sori and spores are such as are found in all leptopuccinious species, and are due in part to the changes in structure which are correlated with the germinating or resting condition, for all such species possess the double physiological role of summer spores and winter spores. The apical walls of this species vary from quite thin and rounded to enormously thickened and beaked.

No. 268. PUCCINIA VERBESINAE Schw. was described originally from material collected in South Carolina, on "Verbesina, Siegesbeckia et aliis." These host names cover *Verbesina occidentalis* Walt., *Siegesbeckia occidentalis* L., and *Verbesina Siegesbeckia* Michx., all referring to the same species, and now generally known under the first name. So far in my studies I do not find that the true *P. Verbesinae* Schw. has been reported upon any other than the type host. Its range is the southeastern United States, from West Virginia to Alabama. All other hosts cited by Sydow under this number should be referred to the preceding species *P. cognata* Syd. The latter species ranges from Texas southward through Mexico, and is distinguished from the eastern species by somewhat larger spores of all kinds, and by teleutospores more inclined toward clavate, paler, and with persistent pedicels. The South American *P. Schileana* may belong with the number following, but unquestionably does not belong here.

No. 290. PUCCINIA XYLORRHIZAE Arth. Since the publication of this species, collections have been received from other stations in Wyoming, one of which from Yellowstone Park, Aug. 30, 1899, No. 6780 (Aven Nelson), was distributed as *P. Asteris*, on *Aster* sp. Another collection on the same host was made by T. D. A. Cockerell, Sept. 24, 1902, at Las Vegas, N. M., and sent out as on *Senecio sp.* The colorless cells found in the sorus, which I at first called pseudospores, I now believe to be remnants of a peridium. Many species produce teleutospores within the aecidial cup, from the same mycelial mass that gave rise to the aecidiospores, and I see no objection to the view that in this species the aecidial stage is represented by a few loose peridial cells, and the uredinial stage by a few loose uredospores.

No. 459. PUCCINIA SALVIAE-LANCEOLATAE Bub., is a synonym of *P. caulicola* T. & G., as the authors have pointed out in the appendix.

No. 504. PUCCINIA DICHONDRAE Mont. occurs in southern California, where it was collected at San Diego, March 9, 1882, by M. E. Jones, No. 3040, and in Orange Co., May, 1903, by S. S. Parish, No. 4808. It has also been reported from Mississippi, by Tracy and Earle (Bull. Miss. Exper. Sta. No. 34:85. 1895).

No. 525. PUCCINIA PHILIBERTIAE E. & E. is a synonym of *P. Gonolobi* Rav., as a recent examination by the writer of the type specimen in the herbarium of the N. Y. Botanical Garden has clearly proved.

No. 529. PUCCINIA COMPACTA Kze. also occurs in Porto Rico, W. I. A collection made by A. A. Heller at Aibonito, P. R., March 22, 1899, on *Asclepias curassavica* L., No. 863, was determined by Ellis as *P. concrescens* E. & E., a name I have been unable to trace. Part of this collection sent to Dr. Bubák was compared with type material and pronounced identical with *P. compacta.*

No. 539. PUCCINIA HALENIAE A. & H. has been found in Wyoming on *Gentiana calycosa* Griseb.

No. 588. PUCCINIA CYMOPTERI D. & H. is undoubtedly a synonym of *P. Jonesii* Pk.

No. 595. PUCCINIA ASPERIOR E. & E. is also a synonym of *P. Jonesii* Pk. The two hosts cited, *Ferula dissoluta* and *Leptotaenia dissecta,* both refer to the same species, the former name being a synonym of the latter. Another host, *Ferula multifida,* cited under *P. Jonesii,* should be written *Leptotaenia multifida.*

No. 634. PUCCINIA MICROICA Ellis, was founded upon an erroneously determined host. The type is unquestionably *Cryptotaenia Canadensis,* and the name becomes a synonym of *P. Cryptotaeniae* Pk.

No. 639. PUCCINIA LINDROTHII Syd. is an undoubted synonym of *P. Jonesii* Pk.

No. 640. PUCCINIA SPHALEROCONDRA Lindr. is another synonym of the very abundant and very variable species *P. Jonesii* Pk. This species also occurs on more than a half dozen species of hosts not reported by Sydow. *Aecidium Leptotaeniae* Lindr. is a synonym not mentioned by Sydow.

No. 652. PUCCINIA SCANDICA Johans. has been collected in Utah at 8900 ft. alt., Aug. 16, 1903, by A. O. Garrett, No. 292, on *Epilobium sp.*

No. 992. PUCCINIA THOMPSONII Hume, is a synonym of *P. Bolleyana* Sacc., or what is the more correct name *P. Sambuci* (Schw.) Arth. This connection has been proven by cultures carried out by Prof. Kellerman.

No. 1064. PUCCINIA OMNIVORA E. & E. is a synonym of *P. Windsoriae* Schw. The host was erroneously determined it being in reality *Tricuspis sesleriodes.*

No. 1071. PUCCINIA PROCERA D. & H. is founded on the same species of host, *Elymus condensatus,* as *P. montanensis* Ellis. The former was published in December, 1893, and is clearly a synonym of the latter, which was published in May, 1893. It is probable that neither of these names covers the rust on *Elymus Canadensis* and similar hosts occurring east of the Rocky mountains. Culture experiments have shown that the form on *Elymus Virginicus* has its aecidium on *Impatiens,* and possibly that on *E. striatus,* but not the form on *E. Canadensis,* whose affinities are not at present known.

No. 1086. PUCCINIA MELICAE (Erikss.) Syd. occurs in abundance in the vicinity of Lafayette, Ind., on *Melica diffusa* Pursh. As in Europe, the uredospores are formed in the greatest abundance; but the teleutospores only appear very late in the season.

No. 1087. PUCCINIA MILII Erikss. has been recently reported by Dr. J. J. Davis from Wisconsin. It was found in the uredoform in Vilas Co., Wis., July 11, 1901, on *Oryzopsis asperifolia* Minchx., but it was not until teleutospores were obtained, Sept. 30, 1903, that the determination of the species could be made. It was also gathered by the same collector at Racine, Wis., Aug. 8, 1903, on *Melium effusum* L., showing only the uredo. The American material agrees perfectly with the European, especially with Eriksson's No. 450 in his *Fungi parasitica scandinavici.*

No. 1101. PUCCINIA ESCLAVENSIS D. & H. should be written *P. eslavensis,* there being a clerical error in the original publication. The name is derived from Eslava (not Esclava), the place where the type collection was made.

No. 1147. PUCCINIA STIPAE Arth. is entirely distinct from the European form on *Stipa,* as cultures not yet published have abundantly demonstrated. The names used by Opiz and Hora do not, therefore, apply to the American species, and indeed, are not applicable to the European species, because they are both *nomina nuda.*

No. 1150. PUCCINIA SUBSTERILIS E. & E. is a synonym of *P. Stipae* Arth., for the so-called uredospores are the resting form, or amphispores, of that species.

No. 1157. PUCCINIA AGROPYRI E. & E. Aecidia of this species are known to occur in North America upon *Clematis ligusticifolia* in Colorado, Montana, Wyoming and Nebraska, on *C. Scottii* in Colorado, on *C. lasiantha* in California, on *Fremontii* in Kansas, on *C. Drummondii* in Arizona, and on *C. Viorna* in Iowa. The forms on *C. Virginiana* and *C. Douglasii* do not be-

long with this species. The first name in the Sydow list, *C. angustifolia,* is a clerical error for *C. ligusticifolia.*

No. 1218. PUCCINIA BAKERIANA Arth. is a synonym of *P. Ellisii* De T., and the host is not a species of *Heracleum,* but *Angelica tomentosa.* The error in determination of the host was pointed out by the collector, after publication. Errors like this would not be so frequent if collectors would make more liberal packets, and especially be careful to include whole leaves, parts of stems, inflorescence, etc., so that the mycologist may have some material on which to found a judgment regarding the host as well as the fungus.

In the above notes it has been the attempt to include matters of fact only, and not to introduce questions of opinion or matters not yet fully established. In order to keep this article within reasonable limits, most of the data upon which the statements are based, have been omitted, but it may be assumed that in every instance proof could be supplied by the writer that would meet the approval of Dr. Sydow and other mycologists.

AGARICUS AMYGDALINUS M.A.C.

EDWARD READ MEMMINGER.

As far as our research shows, *Agaricus amygdalinus* has never been technically described, and the first appearance of the name in print was in Curtis's List of the Fungi in the Geological and Natural History Survey of North Carolina published in 1867. It is not surprising, therefore, that so little being known about this species, even its existence has been questioned.

Dr. Farlow, in an interesting paper, entitled "Notes on Agaricus Amygdalinus, M. A. Curtis," published in the Proceedings of the Boston Society of Natural History, Vol. 26, has brought together all the known facts, and to this paper we wish to acknowledge our indebtedness for much that follows. It is our intention, in this paper, to review these facts, and to introduce others that lead us to the opinion that the plant, named *Agaricus amygdalinus* by Curtis, still grows in the Southern States, and is, perhaps, entitled to specific recognition.

We think it susceptible of proof, that this plant was first published by Curtis as *Agaricus fabaceus* Berk., then this determination not proving satisfactory, it was united by Ravenel with Ag. *campestris* Linn.; dissatisfaction still existing it was finally segregated as *Agaricus amygdalinus* by Curtis.

Its first appearance and publication as *Agaricus fabaceus* Berk. was in Silliman's Journal, Vol. 8, 2d Ser., p. 401. "Agar-

icus Fabaceus Berk.! Ad terram pinguem. July-Nov. Santa Canal. Rav. and Society Hill. First discovered in Ohio by Mr. Lea. This is among the most delicious species for the table. The fresh specimen has a distinct taste and odor of peach kernels or bitter almonds, which are nearly lost in being cooked."

It will be noted that in Berkeley's description of *Agaricus fabaceus* it is said that "when young it has a peculiar but not unpleasant smell." Berkeley's descriptions was published in Hooker's Journal of Botany in 1848; one year after Curtis's article in Silliman's Journal, above quoted, appeared.

Ravenel, a co-worker with Curtis, and from whom Curtis had received specimens of this plant, seems at first to have accepted this determination of this plant, for we find him writing as follows in the Charleston Med. Jour., Vol. 6, p. 190, 1851.

"No. 36. Psaliota Campestris. Linn. Aut. roadsides and green lawns.

"37. Psaliota fabaceus. Berk. All Summer and Autumn on the earth in fileds and gardens. Gregarious. This is the species commonly known as the 'Eatable Mushroom.' It bears a strong resemblance to *Agaricus Campestris,* the common Eatable Mushroom of Europe, the Champignon of the Paris Epicures, and most probably has been brought into use in this country by those who are familiar with the other in Europe. The *Agaricus Campestris* is more rare and both are used indiscriminately. The *Agaricus fabaceus* may always be known by its emitting an odor of almond and peach kernel when fractured."

As time passed, and with further study in the field, Ravenel seems also to have experienced doubts as to the true position of this plant, and we find him, in an address before the Aiken Vine Growing Association published in the Charleston Daily Courier of Aug. 15th, 1862, entitled, "On the Edible Mushrooms of this Country," describing the Amygdaline plant under the name of *Agaricus campestris.* This address was of course very popular in form and substance; but it shows that the he shared Curtis's doubts as to his previous determination of this plant.

Curtis finally settles the matter to his satisfaction in 1867, by creating the species *Agaricus amygdalinus.* The only description we have of this species is contained in a letter from Curtis to Berkeley Oct. 9, 1869, published in Gardner's Chronicle. The chief and only point on which he lays stress, and indeed the characteristic by which he separates this plant from its close allies, *Ag. arvensis* and *Ag. campestris,* is the strong Amygdaline odour and taste. "Indeed this may be regarded as the safest of all species for gathering, as it can be discriminated from all others even by a child or a blind person. Its taste and odour are so very like those of peach kernels or bitter almonds that almost invariably the resemblance is immediately mentioned by those who taste it crude for the first time."

This description, as far as it goes, agrees exactly with what was said of *Agaricus fabaceus* in Silliman's Jour. quoted above.

That the plant, finally described as *Agaricus amygdalinus,* is the same plant as the one formerly described as *Agaricus fabaceus* is proved, *first,* by the agreement of the two descriptions; *second,* by the facts mentioned by Dr. Farlow concerning the change made by Curtis of the labels in his copy of Ravenel's Fungi Caroliniani Exsiccati, to-wit:

"In this connection it is of interest to know that in Curtis's copy of Ravenel's Fungi Caroliniani Exsiccati, Vol. III, No. 3, is a specimen which, according to the label, is *Agaricus fabaceus* Berk. There is a note in Curtis's handwriting stating that this number is *Agaricus Amydalinus* Curtis. Furthermore, in the Curtis Herbarium there are five specimens marked *Ag. amygdalinus,* viz.: '1243 in Arvis arenosis, June, Society Hill; 1236, in hortis et sylvis, May, 1849, Society Hill; 1045, rich soil in gardens, Nov. Santa Canal, Ravenel; 886, Sprague, Mass.;' also two unnumbered specimens collected in Aug. and Sept., 1849. In the case of the first named specimen the name was originally written *Agarius Arvensis* and afterwards corrected to *Ag. Amygdalinus.* In the other cases the name first written was *Ag. fabaceus,* changed later to *Ag. Amygdalinus.*"

Thirdly, that Curtis, after stating that *Ag. fabaceus* existed in North and South Carolina, entirely omits it from his list of Fungi of North Carolina, but places *Ag. amygdalinus* therein; and further, that in his letter to Berkeley, mentioned above, wherein he purports to give his experience with the eatble mushrooms of America, but seems to confine himself to his experience of the Carolinas, he makes no mention whatever of *Ag. fabaceus,* which, in 1849, he had said, was common, but describes at length *Ag. amygdalinus.*

Fourthly, that though Ravenel, in the article quoted above from the Charleston Med. Jour., states that *Ag. fabaceus* was the common Southern edible mushroom, and more abundant than *Ag. Campestris,* yet, in his List of the Edible Fungi of South Carolina, published in "South Carolina; Resources," etc., 1883, *Ag. fabaceus does not appear, though Ag. Amygdalinus* is mentioned therein.

Thus it seems clear that *Ag. fabaceus,* as mentioned and described by Curtis in Silliman's Jour., in 1849, and *Ag. amygdalinus* M.A.C. are intended for one and the same plant; and that both Curtis and Ravenel at first inclined to the view that the amygdaline plant approached closely enough to Berkeley's description to be placed under it, but years after, upon further study, changed their opinion and segregated it as *Ag. amygdalinus* M.A.C.

As said before, so far as is known, Curtis never published a technical description of this species. However, in a fragmentary work of his in manuscript, entitled "Esculent Fungi," which through the courtesy of his son, Rev. C. J. Curtis, I have been permitted to see and make excerpts from, we are enabled to get a more definite idea of this species.

"Ag. Amygdalinus M. A. C. Peach-Kernel Mushroom.

"This is fortunately a species that can be determined without mistakes; it is equal in flavor to the best. Indeed, when cooked it cannot be distinguished from the Pink-Gill. (Some persons pronounce this inferior to the Pink Gill, and pretend that they can distinguish them when cooked. I doubt it. Dr. Warren thinks it superior.) It resembles that very much in appearance, and is easily mistaken for it; but its strong odour and taste of peach-kernels or bitter almonds will at once determine it from all others. When cooked this peculiar flavor is dissipated entirely. To those who are fond of Mushrooms in a crude state this will be superior to all others, leaving an exceedingly pleasant after-taste on the palate. This does not affect grassy lands so much as the preceding species [*Ag. Camp.*], but is most common in cultivated manure grounds, as in gardens, also about stables and in the borders of rich woods. It is from 2-8 in. broad in the cap, according to the richness and mellowness of the soil, with a stem 2-6 in. high gradually enlarged to the base. The colour is whitish or yellowish-white in smaller specimens. In larger ones it is somewhat rusty, with small fibrous patches of the skin which partially detaches from the cap in nearly concentric circles. The gills are white before coming flesh or pink coloured, then changing to brown and black. The veil is much thicker and heavier than in the other [*Ag. Camp.*], detaching itself from the margin of the cap, and falling down upon the stem, where it hangs like a collar for a day or two.

"Comes up in its proper places during Summer and Fall after rains."

Coloured plates of both forms — the large and the small — made by Rev. C. J. Curtis accompany this work.

As no one since Curtis and Ravenel seems ever to have found, in the Southern States, any plant approaching *Ag. amygdalinus* as before known, such great uncertainty surrounded the subject that C. W. Hyams, in his paper on Edible Mushrooms of North Carolina, is prompted to say rather paradoxically:

"This plant is listed by Curtis, but no description of it can be found, and it is a very doubtful species at best. I have found no plant in this state which could possibly be this one. It is therefore admitted entirely upon his authority."

For several years, the writer has had under observation and study a plant which agrees in every particular with Curtis's description, and the accompanying plate of the small form of *Ag. amygdalinus;* so that I am convinced that it is the same plant as the one known to Curtis. As it appears in this locality I would describe it as follows:

Pileus moist, convex, expanded, slightly umbonate, 4 cm. in diameter ,yellow shading to cream, silky fibrillose becoming floccose squamulose, squamules yellow, umbo smooth deep yellow, margin extending beyond lamellæ and sometimes fringed with remains of veil; flesh thin 3-4 mm. thick at umbo becoming thin to margin; stripe 3½-4 cm. long, bulbous, curving, tapering upward, stuffed, yellow floccose below veil, smooth and silky above. Gills adnate to free, white then pink to brown, becoming chocolate-brown. Veil superior pendant, thick, persistent floccose externally. Spores elliptical apiculate 3.5 μ-4 μ x 4.5 μ-5 μ[1] dark brown in colour.

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[1]Note. For the above spore measurements I am indebted to Mrs. Flora Patterson of the Agricultural Department.

Rather solitary in rich woods near stables. Having strong odour and taste of peach kernels or bitter almonds, odour even observable from handling without fracture. Rare but appearing every summer. Sometimes the yellow squamules are removed in age by rains or when the pileus appears cream to white in colour and smooth. The large form of this species has never been found in this locality.

It is clear that Curtis and Ravenel considered the possession by a plant of such a distinctive taste and odour to be a sufficent characterization to entitle it to specific recognition. And, indeed, their view is not without precedent in our time, as no less an authority than Prof. Massee has seen fit, in his treatment of the genus Russula to abandon Fries' classification and adopt one based entirely upon taste; and in our country our greatest authority on the Agaricaceae, Dr. Peck, has, in several cases, made "taste" of commanding importance in separating closely related species, viz., Russula ochrophylla and R. drimeia. Further and similar confirmation could be drawn from the modern treatment of Lactarius.

Recent research, however, has brought to light the fact that we have, in *Psaliota,* a group of closely related species, all of which possess these two characteristics viz: *Agaricus subrufescens, Amygdalinus, variabilis, pusillus, cretacellus,* and perhaps *arvensis* according to McIlvaine; so, unless we are to place them all under *Ag. subrufescens,* it may be advisable to create a Section "Amygdalina" to cover this group of species.

Whether *Ag. amygdalinus,* as above described, is the same as *Ag. subrufescens* is an open question. The description given by Curtis of the large form, seems to point that way, but the small form though possessing the same taste and odour, may prove to be a different species.

Moreover, it would be interesting to know if *Ag. fabaceus* does really belong to the Amygdaline group as Dr. Farlow seems to intimate. Only those who have an opportunity to study this plant in its habitat can ascertain this fact. Prof. Morgan, our only authority on this point, in his Mycologic Flora of the Miami Valley, makes no mention of its taste and odour, and in response to an inquiry from the writer said, "I myself am not very sensitive to odours, and have not noticed it particularly in this Agaric. Odours to me are like tastes, rather difficult to characterize." From this it seems clear that if *Ag. fabaceus* has an amygdaline odour and taste it must be in a very modified degree, as the taste and odour of the plant, as it grows here, could escape no one.

Dr. Farlow, in his paper so often quoted, does not add to our knowledge by giving his personal observation. The only other mention, in botanical literature which we have found on this point, is in Poreher's Med. Pois. and Diet. properties of the Crypt. Plants of the U. S., wherein he says that "Mr. Ravenel informs

me that it [*Ag. fabaceus*] is an alliaceus' edible' mushroom. Whether Ravenel obtained this fact from personal observation does not appear.

From the foregoing it would seem that the geographical distribution of *Ag. amygdalinus* would be from Massachusetts to Texas. Its existence in the former state is proved by the fact that when Curtis identified Sprague's New England plant as *Ag. fabaceus* he had in view *Ag. fabaceus* as described and understood by him in his article in Silliman's Journal, which we have shown was his *Ag. Amydalinus;* and also by the fact mentioned by Dr. Farlow, that the Sprague specimen in Curtis's Herbarium was subsequently changed by Curtis himself to *Ag. amygdalinus.* We therefore have no evidence whatever of the existence of *Ag. fabaceus,* as described by Berkeley, east of the Alleghanies. That *Ag. amygdalinus* exists in North and South Carolina we have ample evidence from Curtis and Ravenel. Featherman states in his Catalogue of Plants of Louisiana, that it exists near Baton Rouge. The authority for its extension to Texas is a note, in H. W. Ravenel's handwriting, on a dried specimen in the National Herbarium, labelled *Ag. amygdalinus* Curtis and collected by Ravenel in Texas in 1869. "*Ag. amygdalinus* Curtis. The eatable mushroom of the Atlantic States. Only one specimen found in good condition, but weather so damp it preserved badly. I send it to show it belongs to the Flora of Texas. April 19. Grassy pastures near Houston."

It would seem, then, that *Ag. amygdalinus* is a regular member of the Fungal Flora of the Atlantic and Gulf States, from Massachusetts to Texas; whereas, so far as now known, *Ag. fabaceus* belongs to the Ohio Valley.

A corollary to be drawn from the above conclusions is that the addition to Berkeley's description of *Ag. fabaceus* of an amygdaline taste and odour, upon the authority of Curtis, as McIlvaine has done in his One Thousand Fungi, is incorrect and misleading.

Until, therefore, it is conclusively proved that *Ag. amygdalinus* and *Ag. fabaceus* are one and the same species, it is proper to confine the description of *Ag. fabaceus* strictly to the words of Berkeley, and no argument for the identity of these species, based on similarity of taste and odour drawn from Curtis's statement in Silliman's Journal, above quoted, can have any weight or force.

NEW GENERA OF FUNGI PUBLISHED SINCE THE YEAR 1900, WITH CITATION AND ORIGINAL DESCRIPTIONS.

COMPILED BY W. A. KELLERMAN AHD P. A. RICKER.

(*Continued from page 250*)

[Deuteromycetæ.]

MYXOLIBERTELLA v. Höhnel n. g. Melanconiaceæ. Annales Mycologici, 1:526. 10 Dec. 1903.

"Est *Libertella* vel *Myxosporium* cum sporulis filiformibus et oblongis (vel fusoideis) commixtis."

[Deuteromycetæ.]

NEOMICHELIA Penzig et Saccardo n. g. Dematiaceae. Malpighia, 15:246. 1902.

"Bicolor. Hyphae caespitosae, simplices v. ramosae, subcontinuae, asperulo-denticulatae, laete coloratae. Conidia nigricantia, elliptico-oblonga 3-pluriseptata, denticulis inserta. Hyphis laete coloratis, conidiis vero nigricantibus genus mox dignoscendum."

[Deuteromycetæ.]

NIGROSPORA Zimmermann n. g. Melanconiaceæ. Centralblatt für Bakteriologie, Parasitekunde, u. Infektionskrankheiten, Zweite Abteilung, 8:220. 17 Feb. 1902.

"Mycel parasitisch im Blattgewebe. Conidienträger aus den Spaltöffnungen hervorbrechend, kurz, an der Spitze eine Conidie tragend. Conidien sehr dunkel gefärbt, kugelig, 1-zellig, mit einem hyalinen Membranring, der die Spitze des Conidienträgers umgiebt, und einer ebenfalls hyalinen Membrankappe an der Oberseite der Conidien."

[Deuteromycetæ.]

NOMURAEA Maublanc n. g. Hyphomyceteae. Bulletin de la Société Mycologique de France, 19:295. 31 July 1903.

"Hyphae steriles repentes, minutae, septatae, hyalinae; fertiles erecta, simplices breves, ramulos ovoideos verticillatim gerentes; conidia ovoidea, continua, pallida, summa ramulorum 4-5 breves catenulas formantia."

[Deuteromycetæ.]

OIDIOPSIS Scalia n. g. Hyphomycetes. Rendiconti del Congresso botanico di Palerma. May 1902.

"Mycelium endogenum, septatum; conidiophori simplices vel parce ramosi, e stromatibus exeuntes; conidia catenulata, cylindracea, conidio apicali sursum actuato-papillato, coeteris utrinque rotundato-truncatulis.

"Ab *Oospora* hyphis distinctis differt; *Oidio* omnino simillima sed endophyta."

[Deuteromycetae.]

PEDILOSPORA v. Höhnel n. g. Mucedineae. Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften, Mathematisch-Naturwissenschaftliche Classe, Wien, 111:1047. 1902.

"Hyphis hyalinis, substilibus, repentibus, obsolete septatis, irregulariter ramosis, hinc inde in matricem penetrantibus; ramulis conidiigeris brevibus, crassiusculis, acutis, plerumque congestis, conidiis acrogenis, pluricellularibus, bilobato-furcatis, lobis parallelis, elongatis, contiguis."

[Deuteromycetæ.]

PELLIONELLA (Sacc. ut subg.) Saccardo n. g. Sphaeropsidaceae. [Diplodiella cardonia Flag. et Sacc.] Malpighia, 15:243. 1902.

"Perithecia subsuperficialia, subcarbonacea, in rostellum producta. Sporulae 1-septatae, fuligineae. Est *Diplodiella* rostrata."

[Deuteromycetæ.]

PHYLLOHENDERSONIA Fl. Tassi n. g. Sphaeropsideae. Bullettino del Laboratorio ed Orto Botanico di Siena, 5:53. 1902.

"Perithecia lenticularia v. globoso-lenticularia v. globulosa, membranacea, maculicola; sporulae oblongae, minutae, 2-pluriseptatae, coloratae."

[Deuteromycetæ.]

PHYLLOSTICTELLA Fl. Tassi n. g. Sphaeropsideae. Bullettino del Laboratorio ed Orto Botanico di Siena, 5:19. 1902.

"Perithecia epidermide velata, lenticularia, membranacea, poro pertusa, maculicula; sporulae ovoideae v. oblongae, continuae, coloratae. Genus *Phyllostictae* analogum sed phaeosporum."

[Deuteromycetae.]

PIROBASIDIUM v. Höhnel n. g. Hyalostilbeae. Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften, Mathematisch-Naturwissenschaftliche Classe, Wien, 111:1001. 1902.

"Stromate compacto, stipitato-capitato vel clavato, stipite e hyphis brunneis vel pallidis, plectenchymaticis, ramosis, coalitis composito; capitulo carnoso-gelatinoso, e hyphis radiantibus, iterum verticillato-ramosis, dense condensatis, denique gelatinose confluentibus formato, ramulis ultimis e cellalis subglobosis constantibus, basidiis 3-5, obpyriformibus, connatis coronatis; conidiis ex apice basidiorum singulatim orientibus, minutissimis, hyalinis, bacilliformibus, parallele denseque stipatis, dein mucedine obvolutis.

"Est status conidiophorus Corynes Bulgariacearum."

[Deuteromycetæ.]

PLECTOTHRIX Shear n. g. Hyphomycetes. Bulletin of the Torrey Botanical Club, 29:457. July 1902.

"Sterile hyphae creeping, scanty; fertile, erect scattered with more or less irregularly arranged spinose branches near the apex; conidia globose, hyaline, borne singly on the tips of the branches.

"This appears most nearly related to the genus *Monosporium* Bon., as treated by Saccardo, but differs in the much simpler fertile hyphae with the peculiar spur-like branches, to which the name refers. The type of the genus is Plectothrix globosa sp. nov.'

[Deuteromycetæ.]

PRITZELIELLA P. Hennings n. g. Hyalostibaceae. Beiblatt zur Hedwigia, 42:(88). März 1902.

"Stromata stipitato-capitulata vel subclavata, simplicia, haud ramosa, hyphis coalitis hyalinis conflata. Conidia catenulata, subglobosa, hyalina. Coremio affin. sed apice haud ramosa."

[Deuteromycetæ.]

PSEUDOBELTRANIA P. Hennings n. g. Dematiaceae. Hedwigia, 41:310. 15 Dec. 1902.

"Hyphae erectae, ramosae, plurime septatae, inflatae, fuscidulae. Conidia acrogena solitaria vel plurima, rhomboidea haud rostrata, medio 1-septata, fuliginea.

"Von Beltrania durch das Fehlen der Setulae, durch die Verzweigung der Hyphen und die nicht geschnäbelten Conidien verschieden."

[Deuteromycetæ.]

PSEUDOMELASMIA P. Hennings n. g. Leptostromataceæ. Hedwigia, 41:115. 23 Juni 1902.

"Stroma effusum membranaceo-crustaceum, atrum; perithecia immersa, rotundata, plana rimosa. Conidia oblonga, hyalina, septata. Melasmiae affin. sed conidia 1-septata."

PSEUDOZYTHIA v. Höhnel n. g. Nectrioideae. Sitzungsberichete der Kaiserlichen Akademie der Wissenschaften, Mathematisch-Naturwissenschaftliche Classe, Wien, 111:1019. 1902.

"Pycnidiis superficialibus, sparsis, pallidis, carnosis, submollibus, globosis, e fibris, exacte parallele condensatis formatis primum clausis, denique late apertis, in margine subciliatis; sporophoris subtilibus, longe ramosis; sporulis pleurogenis, cylindraceo-fusiformibus, hyalinis, unicelluaribus. Planta saprophytica.

"Diese neue Gattung kann nur bei den *Nectrioidaceae-Olluleae* eingereiht werden. Am nächsten stehen *Ollula* und *Cyphina* (Saccardo, Sylloge X, p. 411 od. III, p. 623), doch ist weder die eine, noch die andere dieser Gattungen näher verwendt. Höchst charakteristisch ist das Gehäuse, das aus mehreren Lagen paralleler Hyphen besteht, am Rande in Cilien ausgehend. Die Sporenträger sind im unteren Theile lang verzweight, fädig und tragen seitlich die fast spindelförmigen hyalinen Sporen."

[Deuteromycetæ.]

RHOMBOSTILBELLA Zimmermann n. g. Stilbaceae. Centralblatt für Baketeriologie, Parasitekunde und. Infektionskrankheiten, Zweite Abteilung, 8:221. 17 Feb. 1902.

"Fruchtträger stilbumartig, aber die Conidien nicht von Schleim umgeben und doppelkegelförmig, an beiden Enden zugespitzt."

[Deuteromycetæ.]

Riccoa Cavara n. g. Hyphomycetes? Annales Mycologici, 1:44. Jan. 1903.

"Stroma stipitato-capitatum, firmum, basi hyphis radiantibus, matrici adpressis instructum; stipes celluloso-parenchymaticus tenax, intus lacunosus, sursum in discum sporophorum elatus atqe tenui membrana mox fatiscente obstectus; sporophori deorsum laxe intricati et pro parte fusi, dein liberi, exigui, filamentosi, simplices, continui; sporae pleurogenae, pluriseriatae haud catenulatae."

[Deuteromycetæ]

Scaphidium Clements n. g. Excipulaceæ. Botanical Survey of Nebraska, 5:5. 30 March 1901.

"Apopycnidium oblong or linear-disciform, at length hysterioid, waxy-membranaceous, dark brown; basidia simple; sporidia uniseptate, hyaline, fusoid. Corresponds to Sporonema in the Hyalodidymae."

[Deuteromycetæ.]

Schizotrichum McAlpine n. g. Tubercularieæ. Proceedings of the Linnean Society of New South Wales, 28:562. 1903.

"Sporodochia globose or subglobose, erupment, ultimately superficial, black; setæ septate, thick-walled, erect, straight or slightly curved, few or numerous, conidiophores obsolete or represented by a minute colourless base. Conidia hyaline, filiform, straight or curved, 3 or more septate.

"This genus has a dark coloured sporodochium, but the conidia are hyaline, hence it belongs to the Series Tuberculariæ Mucedineæ, Sacc. Further, on account of the septate spores, it will occupy a place beside Leptotrichum Corda, in which the conidia are only 1-septate and the setæ continuous."

[Deuteromycetae.]

Septotrullula v. Höhnel n. g. Melanconieae. Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften, Mathematisch-Natuswissenschaftliche Classe, Wien, 111:1025. 1902.

"Acervulis perithecio carentibus vel disciformibus vel pulviniformibus, erumpentibus, fuliginosis; strato proligero basali, tenui, minute celluloso, basidiis cylindraceis, arcte stipatis obtecto; basidiis apice in articulos (conidia) cylindraceos, catenulatos, uterinque truncatos, dense et parallele stipatos, transverse septatos, dilabentibus."

"Diese neue Gattung ist charakterisiert durch ein dünnes, kleinzelliges, dunkelbraunes Stroma, das aussen allmählich verläuft und an seiner Oberseite cylindrische, steife, parallele, nicht verzweigte, braune oder blasse, septierte Basidien entwickelt, die eine compacte Masse bilden und oben in dicht gelagerte, cylin-

drische, septierte Conidien zerfallen. Eine Hülle fehlt vollständig, die Entwickelung der Acervuli erfolgt in den äussersten Gewebsschichten — bei den beiden beschriebenen Arten im Periderm — und bricht der Fruchtkörper sehr bald durch und wird frei."

[Deuteromycetæ.]

SIROPATELLA v. Höhnel n. g. Excipulaceæ. Annales Mycologici, 1:401. 30 Sept. 1903.

"Pycnidia globosa, erumpenti-superficialia, carnoso-coriacea, nigra, primum clausa, demum irregulariter dehiscentia et late hiantia. Basidia dense stipata, simplicia, brevia. Conidia acrogena hyalina, didyma, catenulata."

[Deuteromycetæ.]

SPOROCYSTIS Morgan n. g. Tuberculariaceæ. Journal of Mycology, 8:169. Dec. 1902.

"Sporocystis condita Morgan gen. & sp, nov.—Stroma large, subglobose, fleshy, white, with a mycelium of slender white filaments; the spores a dense superficial layer. The pellucid hyphæ compacted into a soft parenchymatous tissue, rich in fatty globules; the spores borne on the more or less distinct extremities. Spores sub-globose, white, 50-70 mic. in diameter, each composed of many small spherical cells, 9-11 mic. in diameter.

"Growing on old leaves in woods; Preston, Ohio, October 1902. The stromata usually scattered, 1-2 mm. in diameter, occasionally two or three confluent. The dry spore shows best the cells of which it is composed. The stroma, mycelium and spores all abound in oil-globules as in the Entomophthoraceæ; these are best exhibited in a drop of water."

[Deuteromycetæ.]

SPORODINIOPSIS v. Höhnel n. g. Hyphomycetes. Annales Mycologici, 1:528. 10 Dec. 1903.

"Hyphæ pallide vel hyalinæ, septatæ, steriles repentes, fertiles erectæ, repetito dichotome ramosæ; ramulis ultimis ad apicem vix incrassatis; conidiis numerosis, hyalinis vel subhyalinis, ovatis, continuis, in capitulum aggregatis, muco conglutinatis."

[Deuteromycetæ.]

STACHYBOTRYELLA Ell. & Barthol. n. g. Hyphomycetes. Journal of Mycology, 8:177. Dec. 1902.

"Differs from Stachybotrys in its paler color, creeping habit and absence of any perceptible basidia, the conidia arising directly from the slightly swollen, minutely roughened apex of the fertile hyphæ."

[Deuteromycetæ.]

STAGONOSPORELLA Fl. Tassi n. g. Sphæropsideæ. Bullettino del Laboratorio ed Orto Botanico di Siena, 5:50. 1902.

"Perithecia globoso-lenticularia, epidermide velata, maculicola; sporulæ cylindraceæ, typice 3-septatæ, hyalinæ."

[Deuteromycetæ.]

STAGONOSPORINA Fl. Tassi n. g. Sphæropsideæ. Bullettino del Laboratorio ed Orto Botanico di Siena, 5:51. 1902.

"Perithecia globosa v. depressa, erumpentia, membranacea v. subcarbonacea; sporulæ ellipsoideæ v. cylindraceæ, minutæ, 2-pluriseptatæ, sæpius guttatæ, hyalinæ."

[Deuteromycetæ.]

STEMPHYLIOPSIS A. L. Smith n. g. Dematieæ. Journal of the Royal Microscopical Society, 1901:617. Dec. 1901.

"Hyphæ intricately branched, colourless, septate; spores terminal on the branches, elliptical or subglobose, 2-many-septate and muriform, colourless."

[Deuteromycetæ.]

STRASSERIA Bresadola et Saccardo n. g. Sphærioidaceæ. Verhandlungen der k. k. zoologisch-botanischen Gesellschaft in Wien, 52:436. 1902.

"Perithecia innato-emergentia, subgloboso-conica, carbonacea, ostiolo punctiformi aperta; sporulæ cylindraceæ, continuæ, chlorino-hyalinæ, subsessiles, sub apice setulâ longa, filiformi, obliquâ præditæ.

"A genere Neottiospora differt sporulis 1-ciliatis. Inter Sphærioidaceas occupabit n. 253. Conf. Sacc., Syll. XIV., p. 40."

[Deuteromycetæ.]

TETRACRIUM P. Hennings n. g. Mucedineæ. Hedwigia, 41:116. 23 June 1902.

Hyphæ steriles repentes, hyalinæ, septatæ; hyphæ fertiles erectæ brevissimæ, continuæ. Conidia acrogena, quadriradiata, elongato-fusoidea, pluriseptata, hyalina. Prismeriæ et Trinacrio affin."

[Deuteromycetæ.]

TORULOPSIS Oudemans n. g. Dematieæ. Ned. Kr. Arch. 3e Ser. 11. 4. 7. 917. 1903.

"Parmi les genres de Dématiées Amérosporées macronémées à conidies caténulées, citées par Mr. Saccardo aux pages 236 et 237 du vol. IV. du Sylloge, on n'en recontre aucun dont les hyphes fertiles (dressées), absolument hyalines, tranchent d'une manière frappante sur les conidies très foncées. Ceci nous décida à créer le genre *Torulopsis,* se distinguant des espèces de Torula par ses hyphes fertiles dûment développées et contrastant nettement avec les conidies sombres qu'elles produisent."

[Deuteromycetæ.]

TRICHOBOTRYS Penzig et Saccardo n. g. Dematiaceæ. Malpighia, 15:245. 1902.

"Hyphæ confertæ caespitosæ, filiformes, indivisæ, parce septatæ, fuligineæ, hinc inde sed remitissime glomerulos condidorum brevissime stipitatos exerentes. Conidia globulosa, continua, fuliginea. Ob habitum et ob conidiorum dispositionem (statum

conidicum *Ascotrichae simulantem*) verisimiliter etiam genus hos ad *Ascotrichae* v. *Chaetomii* cujusdam cyclum pertinet."

TRICHOCOLLONEMA v. Höhnel n. g. Spaeropsideae. Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften, Mathematisch-Naturwissenschaftliche Classe, Wien, 111:1015. 1902.

"Pycnidiis superficialibus, subglobosis, carbonaceis, pilis longis, saepe conidiigeris instructis; sporulis longis, fusiformibus, coloratis, septatis.

"Est *Collonema* piligera cum sporulis septatis, coloratis.

"Diese neue Gattung gehört zu den *Sphaeropsidaceae-Scolecosporeae* und ist am meisten mit *Trichoseptoria, Collonema* und *Septorella* verwandt. Von *Trichoseptoria* unterscheidet sie sich durch die oberflächlichen Pycniden und die gefärbten, lang spindelförmigen Sporen. Von *Collonema* trennt sie die Bahaarung der Gehäuse, die Septierung und Färbung der Sporen. Während *Septorella* durch die kahlen Pycniden und die nicht septierten, farblosen Sporen verschieden ist."

[Deuteromycetæ]

UROHENDERSONIA Spegazzini n. g. Sphæropsideæ. Anales del Museo nacional de Buenos Aires, series III, 8:84. 1902.

"Char. Perithecia lenticularia atra ostiolata erumpentia pusilla glabra; sporulæ pluriseptatæ fusculæ e stipite filiformi hyalino apice incurvo pendulæ, dein libere stipite persistente caudatæ."

[Deuteromycetæ.]

VOLUTINA Penzig et Saccardo n. g. Tuberculariaceæ. Malpighia, 15:257. 1902.

"Sporodochia obconico-hemisphærica, superficialia, læte colorata, setis pallidis hirta. Hyphæ sporodochii dense verticaliter stipatæ et in strata subhorizontalia dispositæ. Sporophora bacillaria simplicia. Conidia cylindracea, catenulata, continua, hyalina. Habitus omnino *Volutellae*, sed conidia catenulata et hyphæ thalamii stratosæ (semper?)."

[Deuteromycetæ.]

XENOPUS Penzig et Saccardo n. g. Mucedinaceæ. Malpighia, 15:240. 1902.

"Hyphæ steriles obsoletæ, fertiles erectæ, simplices, v. ima basi junctæ, continuæ, pallidæ, ubique verruculosæ, apice v. prope apicem spicula pauca conidiophora gerentes. Conidia globosa v. ellipsoidea, solitaria, continua, hyalina. *Rhinotricho* accedit, sed præprimis hyphis ubique verrucosis apice spiculigeris dignoscitur."

[Deuteromycetæ.]

XENOSPORIUM Penzig et Saccardo n. g. Dematiaceæ. Malpighia, 15:248. 1902.

"Hyphæ steriles repentes, septatæ, fuligineæ, hinc inde sporophora brevia exserentes. Conidia magna, erecta, subreniformia, distincte compressa, atronitida, duriuscula, clathrato-septata, latere concavo inæqualiter sinuosa, latere convexo levia. E superficie conidiorum exseruntur conidiola secundi ordinis globosa, continua, fuliginea.—Genus omino mirificum et cum nullo noto comparandum. Sub vitro fortiori conidia videntur disculi verticales atro-nitidi, valde approximati. Quid conidiola fungantur, in vivo inquirendum."

Index to New Genera of Fungi Published Since 1900.

UREDINEOUS INFECTION EXPERIMENTS IN 1904.[2]

W. A. KELLERMAN.

The results of inoculation experiments here recorded constitute the third report of work in consecutive seasons with various species of Uredineæ. It has proved advantageous as in the previous years to attempt inoculations long in advance of the normal season for some of the species used. Not only repeated inoculations are possible the same season, thus at once removing possible doubt which is likely to arise in case of some of the successful inoculations, but this pre-season work insures non-contamination or avoidance of accidental infection, that might not be vouchsafed in case spores are in the air outside the greenhouse, the wide distribution of which in the proper season should of course always be suspected.

If testimony relative to the proposition just suggested were needed, the case of the Maize Rust related in detail below could be cited. Here the work of inoculation was begun in the middle of the winter (Jan. 16) and the successful inoculation was the starting point for an extended series of inoculations on different agricultural varieties of Maize and some other plants. When later work by another Uredinist was published which threw a shadow of doubt on some of the results, it was possible — then late in the season — to repeat the precise experiment alluded to and certainty was thereby restored. The work in detail will now be given.

(1) Contributions from the Botanical Laboratory of the Ohio State University, XVIII.

MAIZE RUST — PUCCINIA SORGHI Schweinitz.

Inoculations with Puccinia sorghi were begun Jan. 16, 1904. Maize plants three to six inches grown in the greenhouse were used as hosts. The teleutospores were secured from infected Sweet Corn of the previous season, which had remained in the field all winter. The infections were tardy in bringing results, doubtless due in the main, to the unfavorable environment of the host plants; by this is meant that the quantity of light daily is much less than during the normal growing season in our latitude because of short days and much smoke and cloudiness in the atmosphere; and, besides, illumined as a greenhouse ordinarily is, a considerable quantity of solar light is excluded by the glass.

In the first experiment, Jan. 16, 1904, (No. 261), Sweet Corn being used as the host, a well developed uredospore sorus was discovered on the under side of one of the leaves Feb. 10, but which must have appeared several days previous.

A second inoculation with the teleutosporic material from the Sweet Corn as in the first inoculation, which was made Jan. 22 (Expt. 262) produced several pustules of uredospores which were noticed and recorded Feb. 16. Some of the sori seemed to be perhaps three days old and others were barely rupturing the epidermis; they were a bright golden color, and it was a most enchanting sight. As late as March 13 uredo-sori were found rupturing the epidermis of other host plants in the same pots and it is believed that they were also the result of the artificial inoculation with teleutospores and not from uredospores on the neighboring plants.

Careful search was made continuously for the possible appearance of spermogonia but here nor throughout the season could the slightest indication of such structures be detected. The appearance of uredospores following directly the sowing of teleutospores led to the conviction — corroborated by later experiments — that the spermogonia and æcidia are not, at least in some cases, included in the cycle of development. The inoculation having been successful in mid-winter excluded even the slightest probability that accidental infection by æcidiospores or even uredospores had obtained.

Uredospores obtained in the first experiment, where teleutospores from Sweet Corn in the field, sowed on Sweet Corn as the host, were used to inoculate Pop Corn (Expt. 280) March 30; at the same time other Sweet Corn plants were inoculated with like material. Uredospores appeared on both hosts April 11th. Here as in most cases throughout the season teleutospores on the same leaves (different sori) appeared later.

Common field corn, that is, Dent Corn, was inoculated April 20 with uredospores from the Sweet Corn. Uredo sori appeared

May 12th on the plants three or four inches high but the stalks fifteen inches high did not exhibit inoculation.

Uredospores from the Dent Corn were then used on Dent Corn both white and yellow, also on Sweet Corn and on Pop Corn (Expts. 294, 295, 296, 306, 308, 323, 324, 325, 356, 384). In all cases success attended the inoculations. It was evident by this time that we had scarcely to think of a probability of "biological" forms or varieties seeing that in case of at least three of the so-called "agricultural species" of Maize there was no invulnerability to one and the *same individual Rust-plant,* if the expression be allowed.

Effort was then made to secure all of the "agricultural species" of maize and attempt inoculations using uredospores of the several kinds of host plants now available. Several repetitions of previously outlined combinations were successfully made (Expts. 292, etc.)

On May 15th uredospores which had been harvested on yellow Dent Corn (these having been obtained by sowing the uredospores from Sweet Corn that were the result of inoculation with the teleutospores from Sweet Corn plants of the previous season, were sown on young Pod Corn plants, (Expt. 355). Sori of uredospores followed May 23. This experiment was repeated with success May 22-29 (Expt. 383).

On the same date (May 15) uredospores (of the same pedigree as those mentioned in the preceding paragraph) were sown on small plants of Flour Corn and on corresponding date, viz., May 23, uredo pustules appeared, (Expt. 357). Repetition of such inoculation was successful, date June 4-15.

For the sake of zeian chronological consistency it may be stated here that on date now mentioned, May 15, teleutospores from Sweet Corn (same as used in first experiment) were sown on Dent Corn and on May 28 uredosori appeared, (Expt. 361). This result is a confirmation of the previous conclusion (result of Expt. 261), namely, that two spore producing stages only are included in the Maize Rust life cycle — based, however, it must be remembered, on two tests only!

Again, using the uredospores obtained by the first inoculation experiments of the season, this time the host being Flint Corn, abundant success followed. In fact from this time on, many plants of Flint Corn, as well as the other kinds used as hosts, became inoculated when placed in close proximity to plants well infected by previous experiments.

It may be stated that uredospore-formation continued as long as the host-plant grew thriftily. But when the latter declined so that the leaves began to turn yellow, pustules of teleutospores appeared.

NO BIOLOGICAL SPECIES OF PUCCINIA SORGHI.

It will be noted that the six so-called "agricultural species" of Maize, namely *Zea everta* (or Pop Corn), *Zea indurata* (Flint Corn), *Zea amylacea* (Soft or Flour Corn), *Zea saccharata* (Sweet Corn), *Zea indentata* (Dent Corn), and *Zea tunicata* (Pod Corn) were used as hosts and with equally successful results. The teleutospores and uredospores were applied as detailed above. The conclusion seems to be warranted that there are no "biologic" species in case of the Maize Rust known as Puccinia sorghi Schw.

A NEW HOST FOR PUCCINIA SORGHI.

Seeds of Teosinte, Euchlæna luxurians, were furnished me by the U. S. Department of Agriculture and thirty young plants were soon available for purposes of inoculation. Using the uredospores obtained by an early inoculation of the season, making the sowings May 15, good infection was exhibited May 24, an abundance of uredospores present at that date. Another infection was made June 4 on this species as host and on June 15 a uredo pustule appeared. So far as I am aware this host has not heretofore appeared in literature.

UNSUCCESSFUL RESULTS ON OTHER HOSTS.

When Schweinitz published his description of Puccinia sorghi he said as to its occurrence: "frequens in foliis Sorghi et Zeæ." Under apparently favorable circumstances many inoculations were attempted with Sorghum vulgare, Saccharum officinarum and Tripsacum dactyloides, all of which were unsuccessful.

Roots of Tripsacum were removed to the greenhouse very early in the spring and numerous vigorous plants were available for the inoculations May 15 and on later dates (Expts. 354, 365, 380, 391, 396, 400, 405), but in no case were the efforts rewarded with success though uredospores were used from sori which furnished the inoculating material for the successful inoculation on Maize plants.

Seedlings of Sorghum vulgare, both common Sorghum and Broom Corn, were inoculated with tested uredospores and yet all the attempts failed. It appears that this host when grown in the greenhouse is invulnerable to Puccinia sorghi from Maize (Expts. 359, 360, 362, 397, 399, 403, and 404).

A living plant of Sugar Cane, Saccharum officinarum, was kindly sent me from Mississippi by Prof. S. M. Tracy. After recovery from the shock of transplanting, inoculation with uredospores similar to material used in previously successful cultures was not successful.

IS AN AECIDIUM SUPPRESSED?

An article appeared in the Botanical Gazette, 38:64-67, July 1904, entitled The Aecidium of Maize Rust, by J. C. Arthur, in which it is shown experimentally that æcidiospores from Oxalis cymosa Small placed on leaves of Maize plants produce uredospores. The following may be quoted from this author: "This prompt and very abundant appearance of the uredo could be interpreted only as the result of the æcidial infection, for corn rust had not yet appeared out of doors, and even if it had, such an unusual attack following closely within the time limit of incubation would be highly improbable. It may therefore be considered proved that the æcidium of *Puccinia Sorghi* Schw. occurs upon Oxalis, and a verification with teleutosporic material can be confidently undertaken in due time."

This result suggested that in spite of two successful inoculations with teleutospores of Maize Rust resulting in the production of uredospores (Expts. 261, 361), a mistake may have been made. Therefore a third infection experiment was undertaken July 15. Precaution was taken to grow and keep the host plants in a section of the greenhouse far removed from that portion in which the former experiments were carried on, to obviate so far as possible any accidental infection. The usual precautions were taken in making the inoculation — teleutospores from Sween Corn grown in the field the previous season being used. After nine days a pustule of uredospores put in an appearance — and thus for the third time during the period of my inoculation work extending from Jan. 16 to July 15, uredospores followed *directly* upon the application of teleutospores.

If these experiments can be relied on, we may say that while Puccinia sorghi Pers. is a heteroecious species (as proven by Dr. Arthur's experiment quoted above) it is able at times to suppress its aecidial stage. We may say besides — judging from the prevalence of the uredo and teleuto stages and the rarity of the aecidium, supposing the work of the two experimenters has really furnished results as recorded — that in the great corn growing belt of our country the aecidial stage is usually suppressed.

SUNFLOWER RUST — PUCCINIA HELIANTHI Schw.

In spite of an abundance of experimental work with Puccinia helianthi Schw. there is not a unanimity of opinion in reference to this common Rust. Whether there are two valid species, P. helianthi Schw. and P. helianthorum Schw., or only one; or whether there are several 'physiological species'; is not as yet agreed upon. Recent inoculation work leads me to think there is but one valid species and that there are no recognizable 'biologic' forms.

I was kindly furnished good teleutosporic material by Professor F. L. Stevens, collected at Raleigh, North Carolina, on

Helianthus tuberosus. Many plants of several species of Helianthus were used in the inoculations as the following account shows.

On Feb. 4, with spores from the Artichoke referred to in the preceding paragraph, the following host plant was inoculated: Helianthus annuus (Expt. 263, 264). Spermogonia appeared on March 1 and aecidia March 3. With similar teleutosporic material sowings were made April 11 on Helianthus giganteus (Expt. 282), H. tracheliifolius (Expt. 283), H. mollis (Expt. 284), H. maximiliani (Expt. 285), H decapetalus (Expt. 286), H. grosse-serratus (Expt. 287), H. orgyalis (Expt. 288), H. kellermani (Expt. 289), H. annuus (Expt. 290). Abundant spermogonia and aecidia appeared April 27 and 30 on the last named host only.

Teleutospores from Helianthus grosse-serratus furnished by Dr J. C. Arthur, Lafayette, Ind., were sown April 13 on the several hosts previously mentioned. Spermogonia and aecidia occurred only on the following hosts: Helianthus annuus (Expt. 297), H. orgyalis (Expt. 298), H. tracheiifolius (Expt. 299), H. kellermani (Expt. 300), H. giganteus (Expt. 302), H. grosse-serratus (Expt. 304), and H. decapetalus (Expt. 305). On May 17 Helianthus tuberosus (Artichoke) was inoculated — but dates and notes lost.

The above shows that Woronin's claim based on experiment that the Rust on Helianthus tuberosus was a different species (Puccinia helianthorum Schw.) from that on Helianthus annuus (Puccinia helianthi Schw.) was inaccurate. His statement as published in the Botanische Zeitung, 30:695-6, 27 Feb. 1872, is as follows: — "Endlich musste ich auch noch folgende Frage lösen: Ist die *Puccinia Helianthorum* Schw., welche Ravenel auf den Blättern der Erdbirne (*Helianthus tuberosa*) gefunden hat, eine selbständige Form, oder ist sie mit unserem Sonnenblumenrost (*Puccinia Helianthi*) identisch? Um diese Frage zo lösen, machte ich im Verlaufs zweier auf einander folgender Sommer (1869 und 1870) zahlreiche Aussaaten sowohl von *Aecidium*-Stylosporen, als auch von Uredo- und Teleutosporen der *Puccinia Helianthi* auf junge Blätter und auf ganze Pflanzen von *Helianthus tuberosus*. Das Resultat war wieder negativ; nicht ein einziges mal gelang es mir, die *Puccinia Helianthi* dem *Helianthus tuberosus* einzuimpfen. Dasselbe Resultat, wie mir aus brieflichen Mittheilungen bekannt ist, erhielt auch Prof. de Bary. Folglich muss man vermuthen, dass die Ravenel'sche Form, die *Puccinia Helianthorum*, eine ganz andere ist, als unsere *Puccinia Helianthi*, welche sich auf *Helianthus annuus* entwickelt."

I would again call attention to the uncertainty of basing too sweeping conclusions on negative results. My work with Puccinia helianthi this year has not been successful in certain cases which alone might have led me to erroneous conclusions, but the

previous year these hosts responded to the inoculations! Moreover, I am ready to express the belief in view of all the work done on Puccinia helianthi by all the experimenters from Woronin down to the present, that there is but one species of Rust inhabiting the several species of Helianthus.

PINE RUST, PERIDERMIUM PINI.

Aecidiospores of Peridermium pini were obtained at Sugar Grove, Ohio, June 1st, and sowings made on Campanula americana. The plants used in the greenhouse — not being well established because of recent transference from the woods—succumbed before the normal time for appearance of any results of possible inoculation. Plants in a neighboring woods were therefore used without being removed from their natural habitat. Pustules of uredospores appeared June 8 on the leaves to which the aecidiospores were applied. The neighboring plants were free from uredo — careful search being made at the time and again at intervals later. It is therefore demonstrated that Coleosporium campanulae (Pers.) Lév. and Peridermium pini are alternate forms of one and the same species.

PUCCINIA THOMPSONII Hume.

Cultures were made with the teleutospores of this species from Carex frankii and the results were published in this JOURNAL, p. 173 (vol. 10), but for the sake of completeness of this report the account is here reproduced:

> In default of guiding clues random cultures were made in 1903 with the teleutospores of *Puccinia thompsonii* Hume, a widely occurring rust on Carex frankii, but no success attended the attempted inoculations. Suspecting a possible connection with the Aecidium of the Elder, *Sambucus canadensis,* and noting the strong morphological resemblance between this species and the forms previously described as Puccinia bolleyana by Saccardo (1891) and Puccinia atkinsoniana by Dietel (1897),[1] attempted inoculations were renewed the present season.
>
> Partially successful results were at first discredited in spite of the strong suspicion entertained that the alternate form would prove to be none other than Schweinitz's *Aecidium sambuci.* At this time I communicated my suspicion to Dr. Arthur, also asking for good culture material in case he had any to share with me. He kindly replied

[1] These were pronounced by Arthur to be one and the same species and the name *Puccinia sambuci* (Schw.) Arthur was applied. Cfr. Bot. Gaz. 35:15. Jan. 1903.

For convenience of reference the accepted name and synonomy may here be summarized.

PUCCINIA SAMBUCI (Schw.) Arthur). Bot. Gaz. 35:15. Jan. 1903.

Aecidium sambuci Schweinitz. Trans. Am. Phil. Soc. Philadelphia, 4:294. 1834.

Puccinia bolleyana Saccardo. Am. Mon. Micr. Jour. 10:1 (fig.) Aug. 1889. Sylloge Fungorum, 9:303 (descr.) 15 Sept. 1891.

Puccinia atkinsoniana Dietel. Bull. Bull. Cornell Univ. (Science), 3:19. June 1897.

Puccinia thompsonii Hume. Bot. Gaz. 29:352. May 1900.

at once, stating that *he had entertained such an opinion* for nearly two years as suggested above though he had no suitable teleutospores for inoculation.

I was fortunate enough to find a small quantity of the Rust that had been exposed all winter, in the vicinity of Columbus. Proceeding with great care, most satisfactory results were obtained in a few days, when several vigorous inoculated host plants of Sambucus canadensis were rendered fairly yellow with abundant spermogonia. [Expt. 326.] In the usual time the plants exhibited the characteristic Elder aecidia — even the infection of petioles and stems causing distortions resulted from the inoculations. The evidence could not be denied by the most skeptical and I can therefore with confidence assert that Puccinia thompsonii Hume is a synonym of P. sambuci (Schw.) Arthur.

It is interesting to note, after all, that the description given by H. Harold Hume in the Botanical Gazette, 29:352, May 1900, differs in no marked or striking degree from those of P. bolleyana and P. atkinsoniana. For example, the teleutospores are said to be "oblong clavate, 46-68 x 15-24 μ," whereas in P. bolleyana they are given as clavate-oblong, 40-60 x 18-28 μ." It is said [l. c.] that this species, P. thompsonii, "somewhat resembles P. bolleyana Sacc., but differs from it in the more scattered, larger, oblong, lighter-colored sori and the somewhat longer and narrower spores." Doubtless the slight discrepancies in the three descriptions are referable to conditions or phases of a temporary character or minor importance.

UNSUCCESSFUL EXPERIMENTS.

Other Rusts were tested as Puccinia emaculata, P. osmorrhizae, P. asparagi, P. curtipes; Rusts from Carex intumescens, C. laxiflora, C. pubescens, etc., but the failures are not instructive and need not be reported in detail.

SUMMARY.

Puccinia sorghi Schw., teleutospores, was shown capable of directly producing uredospores — no spermogonia or aecidia appearing.

This Rust (uredo stage) was readily and indiscriminately transferred to the six 'agricultural species' of Maize, Zea mays amylacea, everta, indentata, indurata, saccharata, and tunicata. Hence there are no 'biologic forms' of Puccinia sorghi Schw.

This species was successfully grown on Teosinte, *Euchlaena luxurians,* which is a hitherto unreported host.

Attempted inoculation of Sorghum vulgare, Saccharum officinarum, and Tripsacum dactyloides were unsuccessful.

Rust from Helianthus tuberosus (Artichoke) was successfully used in inoculating *Helianthus annuus,* showing that the so-called *Puccinia helianthorum* Schw. is the same as Puccinia helianthi Schw.

Teleutospores of Puccinia thompsonii from Carex frankii were grown on Sambucus canadensis — showing that this Rust is Puccinia sambuci (Schw.) Arth.

Peridermium pini was used in a successful inoculation of Campanula americana — showing that this form is contained in the life cycle of Coleosporium campanulae (Pers.) Lév.

ELEMENTARY MYCOLOGY.

W. A. KELLERMAN.

Continued.

It is quickly perceived that plants, so varied and diverse, possess in many cases evident affinity, *i. e.*, relationship with each other. A dozen Willows may be encountered and never would even a child call one of them an Oak, a Fern or a Toadstool. Seldom would a species of Oak, Fern or Toadstool be called by another name. The Roses are really all Roses to the tyro first noticing plants. Close inspection never fails to confirm this first impression. The wood, bark, buds, leaf-venation, flowers and catkins singly show, combined much more positively, the real relationship existing between these kinds, or *species* as they are called. The Rose Family — not exclusively the generally recognized genus of Roses — possesses usually five petals and many stamens, all inserted on the calyx tube — a badge of consanguinity that no other plants possess. The kinds of fruits, leaf-patterns, and many other structures of Rosaceous plants lead one as surely to a grouping of the hosts of these plants into the classes larger or smaller in which by nature they belong. A study of a Flora is largely a search for affinity in the numbers composing it. Looking out upon a landscape or sweeping the eye over prairie or grove yields no specific knowledge of the components that determine the impressions first experienced. An inspection of the individuals is the beginning point of our real knowledge of plants. The likeness of two or more — that is, possession of identical structures (or *characters* as we call them), suggests the idea of relationship between them — an impression that is greatly strengthened by wider experience; till finally the human mind can not resist the conclusion that the entire vegetable kingdom is embraced in this bond of unity. It scarcely need be added that other than mere superficial characters must be investigated — the internal structures, and the physiological phenomena (for these are usually associated with types of organs or anatomical peculiarities) need to be interpreted as well. In short the plant in its entirety, "all in all," must be subjected to the most critical study, and varied and crucial tests. It may be more than the recognizable mass of tissues or anatomical parts; it certainly is composed of matter of apparently various forms or kinds in which inheres remarkable physical energy — or as we say, in our ignorance of their full import, "vital forces."

Species and Lesser Groups.—Observation of the pronounced similarity or essential likeness of individuals enables us to speak at once of a *"kind"* — and this is precisely the idea expressed by the common word *"species."* No technical definition now need

if it could be given of "species" in the organic kingdom. Exact or essential similarity in all the characters manifest in the embryonic development through to maturity and ultimate death, is the leading idea contained in the word species. The individuals are almost invariably so closely similar that a more or less detailed description of any one would apply to all. Moreover, the likeness is so marked that the individuals may be unhesitatingly referred to a common and not very remote parentage. Again, under conditions which are understood — at least recognized — an individual, or set of individuals, may depart to a minor degree from the type as fixed in mind from an examination of many specimens of a kind or species. We would expect in this case that the descendants would show the same characters; to designate such a group the word *sub-species* is to be used. It should be said that at least occasional individuals would be found that connect by perceptible or indeed imperceptible gradations the sub-species with the type or normal species. Perhaps these are the incipient stages of a new species. Moreover, there are *"sports"* which are to be distinguished from real sub-species. In such case we would find a single individual with some remarkable variant structure — say a violet without a spur, a radiate-symmetrical flower when the normal form is irregular in shape, a Mushroom with lop-sided cap, a Collybia radicata without a "root," etc.; and in no instance of the "sport" do we expect the peculiar form to be repeated in the descendants. It may be added, however, that it is feasable "artificially" to multiply the sport and so produce many "individuals." This is done often by horticulturists and florists to obtain their so-called "new varieties," by excising portions of the "sport" and placing these "cuttings" in favorable conditions for continued growth. In this manner many of our ornamental plants and common kinds of cultivated fruit trees "originated"; they are multiplied on an enormous scale for commercial purpose by "grafting" and "budding." Any form of "vegetative" reproduction (as opposed to "seed-reproduction") of the "sport" would likewise continue its existence. In one sense therefore we may, for example, regard the countless millions of Ben Davis apple trees, the Alberta Peach, the Kiefer Pear, etc., as pieces of the one original plant or "sport" from which the first cutting was made. One other group-term is occasionally used by botanists which must here be explained, namely, *"forma"* or anglicised to "form." While this is the common English word it must be remembered that it has here a technical significance. It would be used when the individuals exhibit quite a minor variation; it would scarcely be sufficient to constitute a sub-species. Our knowledge of the Vegetable Kingdom is yet too limited to employ this characterization with much assurance or indeed advantage. And as a matter of fact, for the same reason the other groups, though more patent, are by no means conceived of

in exactly the same sense by different botanists. They are to be regarded as tentative terms — indispensable at present but will undoubtedly be inadequate if not quite incorrect when botanical science is more fully developed.

RACE, STRAIN, CLONE.—Though a brief treatise on Mycology scarcely demands the explanation of any other classificatıory terms than those given above, yet it may be well to elucidate three other subordinate groups, namely, "Race," "Strain," and "Clone" — terms which have their chief use in connection with Agriculture and Horticulture and refer to groups in cultivation. By *Races* we indicate those which have not only well marked and differentiating characters but which propagate themselves true to seed, though slight individual variations would of course be expected. *Strains* include groups of cultivated plants that do no differ in appearance or botanical characters from a "Race" but exhibit some distinctive quality — it may be greater hardiness or adaptability, greater yield, etc. It is a vague distinction at best, and however important in practice, apparently of no botanical or scientific value. But the term *"Clone"* (from the Greek *Klôn*, twig, spray or slip) indicates those plants that are propagated vegetatively, as by buds, grafts, cuttings, suckers, runners, slips, bulbs, tubers, etc. — all of which imply the handling of higher plants exclusively, but any vegetative method of multiplying a desirable species of Mushroom, for example, would likewise come under this head; these would not come true to seed. They are in fact the "individuals" obtained by "multiplying" a sport, or the single plant from which the first cutting or portion was obtained. The important fact to bear in mind is that the plants grown from such vegetative parts are *not individuals in the ordinary sense,* but are "transplanted" parts of the same individual and "in heredity, and in all biological and physiological senses such plants are the same individual."

GENUS, FAMILY, ORDER, CLASS.—As has been intimated the *species* (composed of individuals that are alike) is the convenient biological unit in the classification of organisms. It is the group first or most readily grasped, and therefore the most satisfactory starting point in a discussion of this subject. Going into the fields or woods the individual plants even on cursory examination would unhesitatingly be referred to the various species to which they evidently and really belong. It would also be perceived at once that some sets of species were much alike and others quite unlike. The several species, for example, of Red Oaks, of Black Oaks, of White Oaks, of Bur Oaks, etc., would be associated in mind, and the Willows, the Hickories, the Mints, the Mushrooms, etc., likewise would be readily grouped according to their natural affinities. The species first referred to would form the genus of Oaks (*Quercus*), and in like manner we would have the genus of Willows (*Salix*), the genus of Hickories (*Hicoria*),

the genus of Mints (*Mentha*), and the genus *Agaricus*. A genus then is a group of species that strongly resemble each other. There are always a few, a greater or lesser number of important or essential characters that are common to all the species of the genus; some one if not several or all of these distinctive points would be absent from every other genus of plants. Proceeding in the same manner with genera — that is, grouping those together which have some evident and important resemblance — we get *Families;* these consist of related genera. Again, Families of plants having evident relationship constitute *Orders*. These may be grouped in larger associations that can be denominated CLASSES, and thus the entire Vegetable Kingdom may be synoptically arranged.

NOMENCLATURE.—It has been found convenient and sufficiently definite for ordinary purposes to apply a scientific name to the numerous easily recognized kinds of plants and this consists simply of the *genus* and the *species;* thus the White Oak is called *Quer′-cus al′ba*, the Artichoke *He-li-an′-thus tu-ber-o′-sus*, the Common Mushroom *A-gar′-i-cus cam-pes′-tris*, the Morel *Mor-chel′-la es-cu-len′-ta*, the Sunflower Rust *Puc-cin′-i-a he-li-an′-thi* etc. The botanical name is therefore binomial, consisting of a generic and a specific name — the genus placed first, followed by the species. In case a sub-species is to be designated a trinomial would be used, as *He-li-an′-thus tu-ber-o′-sus sub-ca-nes′cens*, etc. Authors occasionally indicate a "form," where in their opinion the designation of sub-species would scarcely or not at all be warranted, and in such case the scientific name might be a quadrinomial, or if a trinomial the name following the species would be used for a "form" (latinized to *"forma,"* or abridged to *"for."* or *"f."*). It will be found in Manuals, Monographs, Printed Lists, etc., that the author of the species-name is always indicated; thus Quercus alba L., and Morchella esculenta Pers., indicate that Linnaeus named the White Oak and that Persoon is the author of the botanical name of the Morelle. It sometimes happens that two different names have been applied to a species. In such case the one *first given* stands and all later names that may have been applied to that species are *synonyms* and to be discarded. In many cases it has happened that the true relationship of the plants was not correctly apprehended and therefore placed in a wrong genus; or it may be that subsequently a valid genus has been proposed by some botanist to receive a certain species or two or three species of one of the existing genera. In such case the name — for example, of the Kentucky Coffee tree—is written thus: Gym-noc′-la-dus di-oi′-ca (L.) Koch, and the explanation is this: Linnaeus took this plant to be a member of the genus Gui-lan-di′-na, and hence the name in early botanical literature was *Gui-lan-di′-na di-oi′-ca* L. (1753). Later another genus was proposed, *Gym-noc′-la-dus;* and it must be explained that a new spe-

cific name was (of course unwarrantably) coined at the same time for this plant, namely, *can-a-den'-sis,* so that in American Manuals (except recent ones) the name of this tree stands as *Gym-noc'-la-dus can-a-den'-sis* Lam. (1869). But Koch restored the specific name originally applied by Linnaeus, and hence the botanical name of the Kentucky Coffee tree is followed by a double citation of authors and thus stands in print: *Gym-noc'-la-dus di-oi'-ca* (L.) Koch. An example from Mycological literature is as follows: The Corn-Smut is now designated as *Us-ti-la'-go ze'-ae* (Beckm.) Ung., and the history of the nomenclature in this case is as follows. The Smut was called by Beckman *Ly-co-per'-don ze'ae,* and later Unger perceived its relationship to the forms included in the genus *Ustilago,* hence he is credited with this correct combination. Ustilago maydis — so commonly used in botanical publications is a synonym of the name as given correctly above. Still more complicated cases in which the principle of priority is concerned are those where there are two or three (or more) distinct spore-producing stages in the life cycle of the fungus. To illustrate this a common Rust on Wheat may be cited, namely, the species that has been generally called *Puc-cin'-i-a gram'-in-is.* This has its first stage (or first two stages) on Barberry leaves. It was originally named *Ly-co-per'-don poc-u-li-for'-mis* by Jacquin in 1786, but not at all understood, since it has no affinities with the Puffballs (Lycoperdon). Then in 1891 Gmelin named the Cluster-cup stage of this Rust, which occurs on Barberry leaves, *Ae-cid'-i-um ber-ber'-i-dis.* The last stage — in which the spores are called *teleutospores* — was named *Puc-cin'-i-a gram'-in-is* by Persoon in 1797. While it has been the common custom to designate this by the latter name, strict application of the principle of priority (which is certainly desirable) requires that the name be written as follows: *Puccinia poculiformis* (Jacq.) Wettst. — the latter author having in 1885 made this correct combination.

OHIO FUNGI. FASCICLE X.

W. A. KELLERMAN.

List of Species and Hosts.

181. Coleosporium sonchi (Pers.) Lév. on Aster paniculatus Lam.
182. Dimerosporium collinsii (Schw.) Thuem. on Amelanchier canadensis (L.) Medic.
183. Erysiphe polygoni DC. on Polygonum erectum L.
184. Gloeosporium sanguinariae E. & E. on Sanguinaria canadensis L.
185. Gymnosporangium nidus-avis Thax. on Amelanchier canadensis (L.) Medic.
186. Kuehneola albida (Kuehn) Mag. on Rubus nigrobaccus Bailey.

187. Naemosphaera lactucicola Kellerm. on Lactuca virosa L.
188. Peronospora floerkeae Kellerm. on Floerkea proserpinacoides Willd.
189. Phyllactinea corylea (Pers.) Karst. on Celastrus scandens L.
190. Phyllosticta iridis Ell. & Ev. on Iris versicolor L.
191. Polythrincium trifolii Kze. on Trifolium repens L.
192. Puccinia caricis (Schum.) Reb. on Carex riparia Curt.
193. Puccinia fraxinata (Lk.) Arthur on Spartina dactyloides (L.) Willd.
194. Puccinia peckii (DeT.) Kellerm. on Carex trichocarpa Muhl.
195. Rhinotrichum curtisii Berk on Platanus occidentalis L.
196. Septoria malvicola Ell. & Martin on Malva rotundifolia L.
197. Uromyces hedysari-paniculati (Schw.) Farl. on Meibomia paniculata (L.) Kunze.
198. Uromyces lespedezae (Schw.) Peck on Lespedeza violacea (L.) Pers.
199. Uromyces phaseoli (Pers.) Wint. on Strophostyles helvola (L.) Britt.
200. Uromyces sparganii Cke. & Pk. on Sparganium eurycarpum Engelm.

181. Coleosporium sonchi (Pers.) Lév.

On Aster paniculatus Lam.

Buckeye Lake, Licking Co., Ohio. Oct. 26, 1904.

Coll. W. A. Kellerman.

"VREDO SONCHI ARVENSIS: conferta subconfluens fulua, cespitulis planiusculis irreglaribus." D. C. H. Persoon. Synopsis Methodica Fvngorvm, 217. 1801.

182. Dimerosporium collinsii (Schw.) Thüm.

On Amelanchier canadensis (L.) Medic.

Lancaster, Fairfield Co., Ohio. Oct. 18, 1904.

Coll. W. A. Kellerman.

"SPHAERIA COLLINSII, L. v. S., valde abnormis — in aversa pagina folii ignoti (an exotici) mihi ab doctissimo Zachhaeo Collins communicate est.

"S. tomento crasso denissime intertexto efficiente plagas latas effusas inter nervos paginae aversae folii ignoti, e fusco-nigras, floccis suberectis. Subiculo huic floccoso, ereberrime insident perithecia globosa, nigra (S. nidulanti proxima) astoma, vel saltem indistincta ostiolata, sed demum globulo spermatico irregulari, caseos continens, coronata." L. D. de Schweinitz. Transaction of the American Philosophical Society, Philadelphia, N. S. 4:211. 1834.

183. Erysiphe polygoni DC.

On Polygonum erectum L.

Fernwood, Jefferson Co., Ohio. July 24, 1902.

Coll. W. A. Kellerman.

"Erysiphé de la renouée. *Erysiphe polygoni.*

"Les tubercules sont d'abord jaunes, ensuite organés, bruns et noirs; ils émettent en dessous une multitude de filamens blancs, rameux, entrecroisés, qui forment un tissu membraneux étendu sur toute la feuille; ce tissu est plus épais que dans les autres espéces, et se sépare de la feuille sans difficulté. J'ai trouvé cette espéce au commencement de l'été, sur la face inférieure des feuilles des la renouée des petits oisenaux." De Candolle, Flore Francaise, 2:273. 1815.

184. Gloeosporium sanguinariæ E. & E.

On Sanguinaria canadensis L.

Columbus, Ohio. 1903.

Coll. W. A. Kellerman.

"Gloeosporium Sanguinariae E. & E.

"Spots yellow, oblong or irregular, 3-5 mm. diam., situated near the apex of the leaf which is more or less uniformly blackened. Acervuli epiphyllous, numerous, innate, yellow and inconspicuous. Conidia oblong, hyaline, continuous, mostly a little curved, 8-15 x $3\frac{1}{2}$-$5\frac{1}{2}$ μ." J. B. Ellis and B. M. Everhart. Proceedings of the Academy of Natural Sciences of Philadelphia, 1894:371. 30 Nov. 1894.

185. Gymnosporangium nidus-avis Thax.

Roestelia nidus-avis.

On Amelanchier canadensis (L.) Medic.

Sandusky, Erie Co., Ohio. July, 1904.

Coll. W. A. Kellerman.

"*Gymnosporangium nidus-avis*, nov. sp.

"Sporiferous masses when young, cushion like, irregularly globose or oval, small and distinct or elongate and confluent according to the habitat; rich red brown; when mature indefinitely expanded by moisture, orange-colored. Teleutospores two-celled, irregular in shape broadly ovate to sub-elliptical or fusiform, bluntly rounded or slightly tapering towards the apex, symmetrical or often slightly bent. Average dimensions .055 x .025 mm. Promycelia several, not uncommonly proceeding from either extremity. Pedicels when young often more or less inflated below the spore. Mycelium perennial in leaves, branches or trunks of *Juniperus Virginiana* very commonly inducing a "bird's nest" distortion.

"*Roestelia stage.* Spermogonia yellowish orange, preceding the aecdia by about ten days. Aecidia hypophyllus or more commonly on petioles, young shoots and especially on young fruit, densely clustered, brown, at first subulate, then fimbriate; the peridia splitting to the base with its divisions slightly divergent. Peridial cells rather slender; the ridges somewhat prominent, sublabyrinthiform, horizontal or becoming inwardly oblique towards the extremities. Average measurements (towards the apex of the peridia) .07 x .018 mm. Aecidiospores smooth, spherical or irregularly oval to oblong, average diameter 25 mm." Roland Thaxter. Connecticut Agricultural Experiment Station, Bulletin No. 107:6. April 15, 1891.

186. Kuehneola albida (Kühn) Magn.

Chrysomyxa albida Kühn.

On Rubus nigrobaccus Bailey.

Sandusky, Erie Co., Ohio. July 21, 1903.

Coll. W. A. Kellerman.

"Seit dem 14 August d. J. beobachtete ich . . . . auf Rubus fruticosus L. einen ziemlich häufig vorkommenden Parasiten, der an der Unterseite der Blätter kleine, rundliche Häufchen von rein weisser bis

gelblich-weisser Färbung bildet. Die Grösse . . . 0,25-0,5 mm; . . . zuweilen nur vereinzelt, in der Regel aber zahlreich, heerdenweis auf, sind aber immer isolirt, auch bei dichterer Stellung nicht zu grösseren Flecken zusammenlaufend . . . Dem blossen Auge erscheinen die Häufchen . . . ziemlich scharf umgrenzt, . . . bei stärkerer Vergrösserung erkennt man, dass dies durch hervorragende, relativ dicke Fadenenden hervorgerufen wird, welche bei näherer Untersuchung als die unverästelten oder mehr oder weniger verzweigten Sporen einer Chrysomyxa sich ausweisen. Sie bestehen aus einer wechselnden Zahl von Zellen; ohne die Tragezellen sind bei den einfachen Sporen wie bei den Aesten der verzweigten meist 5 bis 6 Zellen vorhanden; die Zahl derselben kann aber auch nur seltner, bei manchen Sporenästen bis auf. 2. Grösse und Gestalt der einzelnen Sporenzellen . . . äusserst mannichfaltig, . . . an die Teleutosporen von Puccinia coronata erinnernd. . . . Die Seitenwand der meisten Sporen ist in der Weise verdickt, dass die Verdickung von unten auf nur gering ist, von der Mitte aus stärker zunimmt und seitlich des Scheitels ihre grösste Stärke erreicht, hier häufig auch abgerundete, mehr oder weniger bedeutende Hervorragungen bildend, die namentlich den Endzellen oft ein kronenartiges aussehen erteilen. Der Scheitel selbst nimmt an der Verdickung mehr oder weniger Theil. Abweichend hiervon findet sich nun bei oberen Zellen, gar keine Verdickung, oder dieselbe kommt nur in sehr mässigem Grade ganz oben seitlich und am Scheitel vor. . . . Die einzelnen Sporenzellen sind von regelmässig cylindrischer oder dem Eiförmigen sich nähernder Gestalt; nicht selten zeigen sie auch eine abgestutzte Kegelform, so dass sie von der schmäleren Basis aus gleichmässig nach oben sich verbreiten; zuweilen kommen auch unregelmässige, an einer Seite oder an einer einzelnen Stelle mehr ausgebauchte Formen vor. Stark gekrönte Endzellen haben nicht selten im Längsdurchschnitt eine kelchförmige Gestalt. Auch die Grösse der einzelnen Zellen ist ungleich. Sehr häufig zeigen sie eine Länge von 30 μ bei 21, 4 μ durchschnittlicher Breite; es kommen aber auch Zellen mit nur 17 μ Länge und 21-26 μ Breite vor. Andererseits findet man mitunter auch relativ längere und schmälere Formen, wie beispielsweise eine Breite von nur 15 μ bei 47, 2 μ Länge. . . . Membran und Inhalt der Zellen ist ungefärbt. . . . Die Keimung der Sporenzellen von Chrysomyxa albida erfolgt bei günstiger Witterung sogleich nach der Reife, und ältere Häufchen enthalten daher in der Regel nur noch leere Sporenzellen. Die Sporen dieses Parasiten keimen ungemein leicht, selbst über Nacht unter dem Deckglas, sobald sie genügend feucht erhalten werden. . . . Die runden, genabelten Sporidien . . . beträgt 8, 5 bis 9, 5 μ.

Die kleinen und mittelgrossen Häufchen werden in der Regel nur von den Teleutosporen der Chrysomyxa gebildet, bei grösseren Häufchen findet sich dagegen meist ein Uredo mit vor, das auch isolirt in der Form kleiner, lichtgelber bis citronengelber Häufchen vorkommt, . . . Diese Uredosporen . . . sind feingewarzt und haben eine durchschnittliche Grösse von 26 μ, sind jedoch sehr wechselnder Gestalt: rundlich, eiförmig und unregelmässig vieleckig." Julius Kühn. Botanisches Centralblatt, 16:154-7. 1883.

187. Naemosphaera lactucicola Kellerm.

On old stems of Lactuca virosa L.

Columbus, Ohio. 1904.

Coll. W. A. Kellerman.

"Naemosphaera lactucicola Kellerm. n. sp.— Pycnidia beaked, clustered but distinct, occupying large areas, deeply seated, at maturity barely perforating the epidermis, black, brittle, globular to pyriform, 150-

250 μ in diameter, ending in a rather broad beak of varying length, but usually about one-half that of the pycnidium; spores brown with an olivaceous tint, broadly oval or oblong, not septate, 18-24 x 7-12 μ." W. A. Kellerman. Journal of Mycology, 10:114. May 1904.

188. Peronospora floerkeae Kellerm.

On Floerkea proserpinacoides Willd.

Columbus, Ohio. May 15, 1903.

Coll. W. A. Kellerman.

"PERONOSPORA FLOERKEAE Kellerm. n. sp.— Conidiophores stout (16-18 μ wide) simple below and elongated, irregularly and profusely branching above, the branches again subdividing sometimes dichotomously but oftener irregularly, the ultimate branchlets more or less plainly dichotomous also much elongated and strongly curved; the branches are very much narrower than the main axis of the conidiophore, the ultimate branches being very narrow and bearing large hyaline oval or sub-globose conidia 24-32 x 18-25 μ; germination unknown. Oospores numerous, subglobular, 24-36 μ, the wall light brown and smooth or slightly rugose." W. A. Kellerman. Journal of Mycology, 10:172. July, 1904.

189. Phyllactinia corylea (Pers.) Karst.

(*P. suffulta* [Reb.] Sacc.)

On Celastrus scandens L.

Sandusky, Erie Co., Ohio. Oct. 15, 1904.

Coll. W. A. Kellerman.

"SCLEROTIVM ERYSIPHE: epiphyllum, granulis aggregatis fusco-nigris, tomento albo insidentibus. *Obs. myc.* 1. *pag.* 13.

b. corylea: tomentum tenuissimum, fungillis in disco impresso subuillosis." D. C. H. Persoon. Synopsis Methodica Fvngorvm, 124. 1801.

190. Phyllosticta iridis Ell. & Ev.

On Iris versicolor L.

Sandusky, Erie Co., Ohio. July and October, 1904.

Coll. W. A. Kellerman and H. H. York.

"Phyllosticta Iridis E. & M.

"Perithecia amphigenous, minute, buried in the leaf, with only the papilliform apex visible, 4-6 together on small (½-1 mm.), dark purple spots thickly scattered over the leaf which at length becomes reddish-brown and dead at the apex and along the sides. Sporules oblong-cylindrical, hyaline, nucleolate, 9-11 x 2½ μ, abundant. The spots soon become dirty white in the centre." J. B. Ellis and B. M. Everhart. Proceedings of the American Academy of Natural Sciences of Philadelphia, 1893:456. 1893.

191. Polythrincium trifolii Kunze.

On Trifolium repens L.

Columbus, Ohio. June 25, 1903.

Coll. W. A. Kellerman and O. E. Jennings.

"Polythrincium Trifolii findet sich im Sommer und Herbst auf der Unterseite grüner Blätter mehrerer Kleearten (Trifolium pratense, alpestre, fragiferum), dem unbewaffneten Auge als schwarze Flecken mit gelb gefärbtem Rande erscheinend. Die Mikroskopische Untersuchung zeigt, dass die unregelmässigen Flecken aus gerundeten, genäherten, selten zusammengeflossenen Räschen bestehen, welche nicht die Grösse eines Leinsaamens erreichen. Fig. 8. a stellt eine durch die Linse A vergrösserte Gruppe kleiner Räschen vor, welche dem eyförmigen, zweyfächrigen körner liegen ursprunglich auf dem obengedachten Pseudostroma um die Basis der Fäden, so dass sie leicht übersehen werden können Diess und das Vorkommen des Pilzes auf lebenden Pflanzentheilen kann leicht dazu verführen, diese Gattung unter die Entophyten, in die Nähe von Phragmidium Lk. (Aregma Fries, und Puccinia Nees) zu bringen. Presst man den Durchschnitt eines Häufchen zwischen zwey mit Wasser benetzten Glasplatten zusammen: so treten die Sporidia deutlich hervor (fig. 8. b. durch B.) Man bemerkt dabey, dass die körner nicht etwa abgestossene Endgleider der Fasern sind. Fig. c. d. noch stärkere Vergrösserung einzelner Fasern durch c.

"Von einigen Botanikern erhielt ich diesen keineswegs seltenen, Pilz, den ich öfters bey Leipzig und Lauchstädt bemerkte, für sphaeria Trifolii P." Kunze, in Mykologische Hefte, 1:14-15. 1817.

192. Puccinia caricis (Schum). Reb.

Uredo and Teleuto.

On Carex riparia Curt.

Columbus, Ohio. July 26, 1902.

Coll. W. A. Kellerman.

Supplement to No. 71.

193. Puccinia fraxinata (Lk.) Arthur.

P sparganoidis E. & B., *P. peridermiospora* Arth.

Teleuto

On Spartina dactyloides (L.) Willd.

Sandusky, Erie Co., Ohio. Oct. 15, 1904.

Coll. W. A. Kellerman.

"Puccinia sparganioidis Ell. & Barth.

"II and III. Amphigenous. Uredosori very narrow, orange-yellow, about one mm. long, at first covered by the epidermis, then naked. Uredospores obovate or pyriform, orange-yellow, aculeate, stipitate, 25-35 x 14-20 μ. Teleutosori small, elliptical or linear, 1-1½ (exceptionally 2-2½) mm. long, soon naked nearly black. Teleutospores oblong-elliptical or oblong-clavate, very slightly constricted, 35-55 x 15-20 μ, rounded, or often obtusely pointed above, mostly narrowed below into the stout, persistent, 40-50 μ long, sub-equal, hyaline pedicel. Epispore smooth, distinctly thickened above." J. B. Ellis and Elam Bartholomew. Erythea, 4:2. 1896.

194. Puccinia peckii (DeT.) Kellerm.

Uredo and Teleuto.

On Carex trichocarpa Muhl.

Columbus, Ohio. July 26, 1902.

Supplement to No. 28.

The name on label for No. 28 should be changed to accord with No. 194.

195. Rhinotrichum curtisii Berk.

On Rotten wood of Platanus occidentalis L.

Sandusky, Erie Co., Ohio. Aug. 10, 1904.

Coll. W. A. Kellerman.

"Rhinotrichum Curtisii. *B.*—Aureum; floccis deorsum divisis flexuosis apice tumidis; sporis subglobosis. *Asperillus laneus.* Schwein.

"Threads more or less branched, flexuous, sometimes curved above (as in specimens from Venezuela), articulate, the upper joint swollen, with occasionally a second, covered with little spicules, to which the globose or subglobose spores, .0005 in. diameter, are attached." M. J. Berkeley. Grevillea, 3:108. March, 1875.

196. Septoria malvicola Ell. & Martin.

On Malva rotundifolia L.

Columbus, Ohio. Oct. 13, 1904.

Coll. W. A. Kellerman.

"Septoria malvicola, E. & M. n. s.

"Spots gray, partially limited by the veinlets, 2-3 millim. broad, clustered and coalescing, bordered by a yellow discoloration; perithecia black, subglobose at first, afterwards depressed, thinly membranaceous, clustered, numerous, mostly epiphyllous, 90-100 μ; sporules hyaline, linear, ends obtuse, a little curved, faintly 3-4-septate, 30-37 x 1 μ. On leaves of Malva rotundifolia. George Martin. Journal of Mycology, 3:65. June, 1887.

197. Uromyces hedysari-paniculati (Schw.) Farl.

On Meibomia paniculata (L) Kunze.

Lancaster, Fairfield Co., Ohio. Oct. 8, 1904.

Coll. W. A. Kellerman.

Supplement to No. 37.

198. Uromyces lespedezae (Schw.) Peck.

On Lespedeza violacea (L.) Pers.

Sugar Grove, Fairfield Co., Ohio. Oct. 8, 1904.

Coll. W. A. Kellerman.

Supplement to No. 39.

199. Uromyces phaseoli (Pers.) Wint.

On Strophostyles helvola (L.) Britt.

Sandusky, Erie Co., Ohio. Aug. 10, 1903.

Coll. W. A. Kellerman.

"VREDO APPENDICVLATA: badia, sporulis rotundatis caudatis. *Obs. myc. pag.* 17.

"*a.* Vredo *Phaseoli*: conferta subconfluens badia puluinata inqinans." D. C. H. Persoon, Synopsis Methodica Fvngorvm, Pars Prima, 222. 1801.

200. Uromyces sparganii Cke. & Pk.

On Sparganium eurycarpum Engelm.

Buckeye Lake, Licking Co., Ohio. Oct. 26, 1904.

Coll. W. A. Kellerman.

"Uromyces Sparganii C. & P.

"Sori minute, oblong, crowded, black, spores pyriform or oblong-pyriform, about .001 in. long; pedicel colored, shorter than or equal to the spore in length." Chas. H. Peck. Report on the New York State Museum, 26:77. 1874.

NOTES FROM MYCOLOGICAL LITERATURE X.

W. A. KELLERMAN.

PART II, INOCULATION — experiments with the conidia of E. graminis on species of Bromus, is a continuation of the article by Ernest S. Salmon, on Erysiphe graminis DC. and its adaptive parasitism within the genus Bromus. This important and extended work is given in detail and reference to the original only can be made here, (Ann. Mycologici, 2:307-343, Juli 1904), but a sentence or two may be transcribed: Now it is possible, by a cultural method I have lately described — in which the leaf to be inoculated is injured by the removal of a minute piece of leaf tissue — to demonstrate that the immunity shown by a plant against a certain fungus disappears when the normal vitality of the leaf is interferred with . . . . It is possible also that the susceptibility ultimately shown by these plants of *B. racemosus* on being kept for several weeks in the laboratory, may be accounted for in some cases by the fact that the health of the plants became gradually impaired by the unfavorable condition of growth.

THE JOURNAL OF MYCOLOGY FOR JULY 1904 contained the following articles: Morgan — New Species of Pyrenomycetes;

Holway — Notes on Uredineae, II; Ricker — Notes on Fungi, I; Ellis and Everhart — New Species of Fungi; Kellerman — A New Species of Peronospora, Cultures of Puccinia Thompsonii, Elementary Mycology (continued), Index to North American Mycology, Notes from Mycological Literature, XI; Kellerman and Ricker — New Genera Published Since 1900.

IN THE MARCH NO. OF THE JOURNAL OF MYCOLOGY (1904) the following articles were published: Morgan — A New Melogramma; Cockerell — Some Fungi Collected in New Mexico; Dudley and Thompson — Notes on California Uredineae and Descriptions of New Species; Kellerman — Ohio Fungi (Fascicle IX), Minor Mycological Notes (III), Index to Uredineous Culture Experiments (Concluded), Notes from Mycological Literature (IX), Elementary Mycology.

THE ARTICLES IN THE MAY NO. OF THE JOURNAL OF MYCOLOGY were: Morgan — Tubercularia Fasciculata Tode; Smith — A New Egg Plant Fungus; Durand — Three New Species of Discomycetes; Christman — Variability of Dictyophora; Cockerell — A New Hypholoma; Clements — A Translation from Saccardo: Diagnostica; Kellerman — A New Species of Naemosphaeria, Minor Mycological Notes (IV), Index to North American Mycology, Elementary Mycology (Continued), Notes from Mycological Literature; Kellerman and Ricker — New Genera Published Since 1900.

AECIDIUM INULAE-HELENII CONST. N. SP. AND UROMYCES VICIAE-CRACCAE CONST. N. SP. are two new Uredineae described by J. C. Constantineanu in Annales Mycologici, 2:250-3, Mai 1904, collected in Roumania. Hitherto no Aecidium has been found on the Elecampane. The Uromyces on Vicia cracca approaches U. striatus in having striae — *membrana longitudinaliter lineolis parallelibus vel anastomosantibus praeditis, raro quasi laevibus*; but the form and color of the papilla is characteristic — *apice papilla conica obtusa, hyaline ornatis.*

THE SECOND INSTALLMENT OF ASCOMYCETES AMERICAE BOREALIS, autore Dr. H. Rehm, is given in Annales Mycologici for July 1904. Those enumerated are Nos. 27-39. Three of them are new species, and most of them are new names.

UEBER DAS AUFTRETEN VON PLASMOPARA CUBENSIS IN OESTERREICH, von Dr. Ludwig Hecke, Annales Mycologici, 2:-354-8, Juli 1904, shows that this Mildew has entered Austria (not before reported in that country nor in Germany). The author notes the present distribution as follows: Cuba, 1868, Japan 1889, and same year disastrous in North America,- Mandschurei 1876, lately England also in Hungary. This author also states: Während also die Form der Sporangienträger dieses

Pilzes und die braun-violette der Sporangienwand mit gewissen Peronospora-Arten der Gruppen Intermediae und Undulatae fast vollkommen uebereinstimmt, muss der Pilz nach der gegenwärtigen Guttungsbezeichnung doch wegen der Keimung mittelst Schwärmsporen zur Gattung Plasmopara gestellt werden.

MYCOLOGICAL NOTES, No. 17, C. G. Lloyd, June 1904, consists of Notes of Travel, 272; The History of Geaster fornicatus in England, 273; N'abusez pas du Microscope, 274; Erroneous Genera and Species, 275; Anthurus borealis in England, 276; Polysaccum boudievi, 277; Quiletia mirabilis, 278; The Name Polysaccum, 279; Austra- Fairy-ring Puff Ball, 280; Historical Notes, 281; Types, 282; Oza-wahp-abe-sah, 283; Anthurus, borealis in Massachusetts, 284.

THE ARTICLES IN THE JULY NO. OF THE ANNALES MYCOLOGICI (1904) are as follows: Salmon, On Erysiphe graminis DC., and its adaptive parasitism within the genus Bromus (fortsetzung); McAlpine, Some Misconceptions concerning the Uredospores of Puccinia pruni Pers., and Note on the Arrangement of Teleutospores in Puccinia pruni Pers.; Sydow, Neue und kritische Uredineen; Rehm, Ascomycetes Americae borealis, II; Hecke, Ueber das Auftreten von Plasmopara cubensis in Oesterreich; Oudemans, Puccinia veratri; Trotter, Intorno all' Uromyces giganteus Speg.; Bubák, Vorläufige Mitteilung ueber Infektionsversuche mit Uredineen im Jahre 1904.

D. MCALPINE exposes some Misconceptions concerning the Uredospores of Puccinia pruni Pers. in Annales Mycologici, Juli 1904 (2:344-8), showing that there are not two kinds as often maintained — with and without thickened apex — but one kind only, always too with apical thickening. He also shows the fallacy of claiming here the existence of a Uromyces amygdali — for such spores represent merely the Uredo stage of Puccinia pruni. Two nuclei were detected in the uredospores — one only in the teleutospores. The author also noted a ball-like arrangement of the teleutospores.

THE POLYPORACEAE OF NORTH AMERICA, VIII — Hapalopilus, Pycnoporus and new monotypic genera — an article of 14 pp. in the August No. of the Bulletin of the Torrey Botanical Club, by William Alphonso Murrill, contains notes on the species, keys to the species, synonyms, distribution, also a synopsis of the genera treated in articles I-VIII of this series. The new genera proposed are : *Abortiporus,* type Boletus distortus Schw.; *Cyclomycetella,* type Boletus pavonius Hook.; *Cycloporus,* type Cyclomyces greenei Berk.; *Globifomes,* type Boletus graveolens Schw.; *Nigrofomes,* type Polyporus melanoporus Mont.; *Poronidulus,* type Boletus conchifer Schw.

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NOTES.

The March No. of the JOURNAL will be delayed a month or more by the absence of the editor, who will spend the winter months in Guatemala, Central America, collecting parasitic fungi. Letters sent sent to Columbus as usual will receive attention.

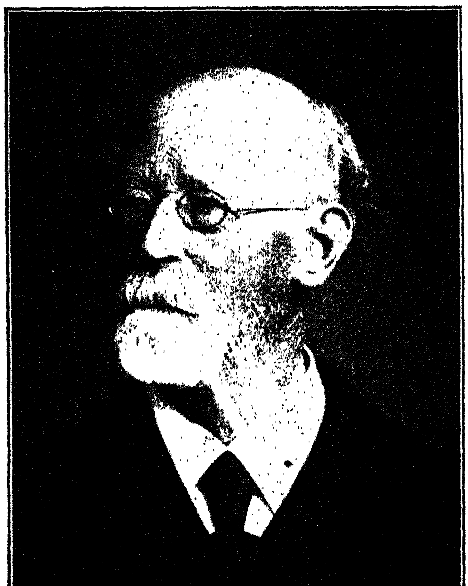
This No. of the JOURNAL is smaller than usual because its early appearance was necessitated. The delayed March Number will restore the normal size.

INDEX TO VOLUMES 1-10. — At an expense of much time and many printed pages a complete Index to date ends Volume 10, which doubtless will be of the greatest convenience to mycologists. Perhaps some persons will wish a separate copy—which can be furnished for 75 cents.

PHYLLACHORA ADOLPHIAE ELL. & KELLERM. A SYNONYM OF PHYLLACHORA MEXICANA Turconi. With the title "A New Phllachora from Mexico" there was published a species that had been previously published by Malusio Turconi. We were not aware at the time that Prof. A. L. Herrera had sent material to anybody but ourselves, hence one cause for the misfortune. Turconi's description was published in Atti dell' Ist. Bot. Univ. di Pavia, which was tardy in reaching us. His species, two forms, are here appended.

PHYLLACHORA MEXICANA TURCONI N. SP.—*Stromatibus numerosis, dense gregariis, rarius confluentibus, subrotundis vel eliptico-elongatis; prominulo-applanatis vel leniter convexis, laevibus, atro piceis, minutis 1-2 mm. diam., denique longitudinaliter fissis, 2-4 locularibus; loculis globoso-depressis vel lenticularibus, ascis cylindraceis 80-110, 12-15 μ superne rotundatis, infere brevissime et spurie attenuato pedicellatis, aparaphysatis, octosporis, sporis oblique monostichis, rarius subdistichis, ovato-elipsoideis, utrinque rotundatis, hyalinis 11-15, 6,5-8 μ, granulosis.*
In ramulis vivis Adolphiae infestae, Mexico.

CYTOSPORINA ADOLPHIAE. — *Stromatibus nigris, prominulo applanatis, minutis (habitu externo Ph. mexicanae) irregulariter plurilocularibus, loculis plerumque irregulariter sinuosis, rare subrotundis, sporulis copiosissimis, filiformibus exilissimis, plerumque leniter curvatis, rarius rectis vel leniter flexuosis, utrinque acutatis 23-25, 1 μ hyalinis, basidiis cylindricis 25-2 μ dense fasciculatis, hyalinis suffultis.*
In ramulis vivis Adolphiae infestae socia Phyllachora mexicana cuius status spermogonicus esse mihi videtur.



Dr. H. Rehm.

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THE GENUS GIBELLULA CAVARA.

A. P. MORGAN.

In Michelia I, 83, Saccardo described a Hyphomyces, which he named *Corethropsis pulchra*, stating that it grows on dead insects and their ISARIA. In his Mycologie Lombarde Cavara takes the view, if I may judge from the brief exposition in Sylloge XI, 643, that the Isaria and the Corethropsis are to be taken together as one plant; upon this he founds his genus Gibellula. Saccardo appears to concede this view to be correct. Then it is also very probable that Corethropsis australis Speg. is simply the sporiferous hyphae of Isaria arachnophila; this is the inference we would make from the observation of Oudemans concerning the latter species, quoted Sylloge IV, 587. Should the type species, Corethropsis paradoxa Corda, turn out to be a similar organism, Cavara's genus will be canceled and Corethropsis will take its place among the Hyalostilbeae. Bonorden's figure labeled Stachylidium paradoxon certainly suggests this disposition of the species. I can not refer to the Prachtflora but Corda in Icones V, 14, describes a "stroma."

Without knowing just how the genus Gibellula or Corethropsis is going to be defined, I venture to contribute to it the following species. I assume that the so-called "basidia" and "sterigmata" are the lower and longer joints or spores of a chain proliferously developed, as in Cladosporium for example.

GIBELLULA CAPILLARIS Morgan n. sp.—Stroma simple, capillary, flexuous, curved and coiled, fulvous, whitish at the summit; the base none or very short, almost the whole surface sporiferous. Hyphae longitudinal, very slender, fulvous, solidly packed together and connate, at the surface giving off very short or minute sporiferous branchlets; the sporophores thick, obtuse, pellucid, each from its apex producing several spores in one or a few short chains, which are proliferously developed. Spores clavate, smooth, hyaline, 6-9 x 1-2 mic.

Growing out of very small dead insects among the old leaves in woods; Preston, O., June 14, 1903. There are as many as a dozen growing out of one small insect, curved and coiled about it like a bundle of fine hairs. The stromata 5-8 mm. long, 40-60 mic. in thickness; the sporophores scarcely longer than the spores but much thicker.

CULTURES OF UREDINEAE IN 1904.[1]

J. C. ARTHUR.

The present article forms the fifth of a series of reports[2] by the author upon the cultures of plant rusts. They cover the years from 1899 to the present year inclusive. In these studies the grass and sedge rusts hold a prominent place, but some other heteroecious and a few autoecious rusts have been included.

During the period when the cultures are in progress, the constant attention of one person is required to assort the material which is in germinating condition from that not yet ready to germinate, to sow the spores, to maintain a careful watch for the first appearance of the spermogonia and aecidia, and to keep the records with unimpeachable accuracy. At the beginning of the present season the Indiana Experiment Station established a cooperative agreement with the Bureau of Plant Industry of the U. S. Department of Agriculture to mutually assist in carrying on the annual culture work. Through the government assistance Mr. F. D. Kern, a senior student from the University of Iowa, recommended by Professor T. H. MacBride, was secured to take charge of the cultures. Mr. Kern proved an exceptionally able man for the position, having unusually keen and accurate powers of observation, a retentive memory, and scholarly enthusiasm. Mr. Kern's work extended through May, and a part of April and June.

[1] Read before the Botanical Society of America, Philadelphia, December 30, 1904.

[2] See Bot. Gaz. 29:268-276; Jour. Mycol. 8:51-56; Bot. Gaz. 35:10-23, and Jour. Mycol. 10:8-21.

I am under many obligations to a number of botanists, who have most kindly sent me teleutosporic material, and in some cases particular host plants on which sowings could be made. My especial thanks are extended to those who have made field observations, and provided me with clues to solve the relationship of isolated forms, the information received from Rev. J. M. Bates, and Mr. E. W. D. Holway, being particularly helpful. Further acknowledgments are made under the several species. I should further mention the kindness of Messrs. R. Douglas' Sons, of Waukegan, Ill., who sent twenty-five thrifty young larch without asking payment, as they did a year ago.

During the present season 90 collections of material were employed, and 261 drop cultures and 10 Petri dish cultures were made from them to test the germinating condition of the spores. Out of these 38 collections refused to germinate, and were consequently useless. There were in all 264 sowings of spores made, representing 40 species of rust, and for this purpose were required 119 species of hosts temporarily grown in pots in the greenhouse.

A few cultures were made with material for which no clues were obtainable to indicate the possible relationship, and in every case with negative results. The record is given here, as in previous years, to serve for future reference.

1. PUCCINIA on the leaves of *Elymus Canadensis* L., sent by Rev. Bates from Red Cloud, Neb., was sown on *Baptisia tinctoria, Polygala Senega, Uvularia perfoliata, Mimulus ringens, Symphoricarpos pauciflorus,* and *S. racemosus,* with no infection. Two other hosts were tried in 1903, with equally negative results.[3]

2. PUCCINIA on *Muhlenbergia Mexicana,* sent by Mr. E. Bartholomew from Stockton, Kans., was sown on *Hibiscus militaris,* with no infection. Similar material sent by Rev. J. M. Bates from Red Cloud, Neb., on *M. racemosa,* was sown on *Asclepias incarnata,* and twice on *Hibiscus militaris,* with no infection. What is probably the same fungus on the latter host coming from Callaway, Neb., was sown in 1902 on ten other species of hosts with equally negative results.[4] It is evident that while some of the rust found upon *Muhlenbergia* undoubtedly is associated with the aecidium on *Hibiscus,* as Professor Kellerman clearly proved last year,[5] there are other forms having entirely different aecidia, not yet ascertained.

3. PUCCINIA on *Carex Pennsylvanica,* sent by Rev. Bates from Red Cloud, Neb., was sown on *Ambrosia trifida, Polemonium reptans, Erigeron annuus, Lepidium apetalum,* and *Solidago*

[3] Jour. Mycol. 10:10. 1904.
[4] Bot. Gaz. 35:11. 1903.
[5] Jour. Mycol. 9:109, 232. 1903.

Canadensis, with no infection. Similar material on the same species of host, gathered at Lafayette, Ind., was sown on *Oxalis violacea*, *Actaea alba*, *Macrocalyx Nyctelea*, *Apios Apios*, and *Solidago ulmifolia*, with no infection. What is probably the same species of rust, on the same host, was sown in 1903 on eleven other species of hosts with negative results.[6]

4. PUCCINIA on *Carex gravida*, sent by Rev. Bates from Red Cloud, Neb., was sown on *Steironema ciliatum*, with no infection. Similar material from the same source was sown in 1903 on twelve other species of hosts with negative results.[7]

5. PUCCINIA LUDIBUNDA E. & E., sent by Mr. E. Bartholomew from Stockton, Kans., was sown upon *Steironema ciliatum*, *Macrocalyx Nyctelea*, and *Xanthium Canadense*, with no infection.

6. PERIDERMIUM on *Pinus rigida* was sent by Professor W. A. Kellerman from Sugar Grove, Ohio, in fine quantity, with the suggestion that it would probably grow upon *Campanula*. It was sown June 1st on what were supposed to be four plants of *C. Americana*, but which proved to be *Lobelia syphilitica*, when the plants came into bloom. The plants were unusually thrifty, and conditions for success were good, but there was no infection. Part of the same collection of spores grew on *C. Americana*, when sown by Prof. Kellerman,[8] showing that they belonged to *Coleosporium Campanulae* (Pers.) Lev.

Sixteen species of rusts were successfully grown, that had been studied with success before, and reported upon by the writer and in part by other investigators. Mention of them here serves to confirm previous work, and to give some additional knowledge regarding hosts.

1. MELAMPSORA MEDUSAE Thuem.—Teleutosporic material of this species on *Populus deltoides* was obtained near Lafayette, Ind., and sown May 10 on *Larix decidua* and *Euonymus obovatus*. The latter gave no result, but the former showed spermogonia on May 25, yet owing to weakness of the hosts no aecidia formed. The same collection was used to sow on *Larix laricina* (Du R.) Koch (*L. Americana* Michx.) May 23, which showed spermogonia June 4, but the host was too weak to permit aecidia to form.

Teleutosporic material on *P. deltoides* from Spirit Lake, Iowa, by the writer was sown May 10, on *Larix decidua* and *L. laricina*, with only feeble results on the former owing to the weakness of the hosts. Another sowing was made May 23 on *L. decidua*, which gave abundance of spermogonia on May 30, and an equal abundance of aecidia on June 4.

[6] Jour. Mycol. 10:10. 1904.
[7] Jour. Mycol. 10:10. 1904.
[8] Jour. Mycol. 11:32. 1905.

Teleutosporic material on *Populus tremuloides* Michx. was sent from Racine, Wis., by Dr. J. J. Davis, and was sown on *Larix decidua*, May 25. Abundance of well developed spermogonia appeared on June 5, followed by strongly developed aecidia on June 10. This culture is specially significant in showing that the poplar rust of North America is probably all of one species, as assumed in last year's report of cultures.[9]

2. PHRAGMIDIUM SPECIOSUM Fr. has twice before been the subject of cultures, being grown in 1899[10] on a tea rose from the garden, and in 1902[11] on *Rosa humilis*. The teleutosporic material used this season was obtained by the writer at Spirit Lake, Iowa, on *Rosa Arkansana*. It was sown on *R. Arkansana* Port., *R. Carolina* L., *R. humilis* Marsh., and *R. nitida* Willd., with abundant success in each case. It was sown twice on *R. lucida* Ehrh. without success, although the host was in fine growing condition. The dates were as follows:

May 7, Teleutospores sown on *R. Arkansana;* May 14, spermogonia; May 20, aecidia.
May 7, Teleutospores sown on *R. Carolina;* May 14, spermogonia; May 18, aecidia.
May 17, Teleutospores sown on *R. humilis;* May 23, spermogonia; May 30, aecidia.
May 17, Teleutospores sown on *R. lucida;* no infection.
June 1, Teleutospores sown on *R. lucida;* no infection.
June 1, Teleutospores sown on *R. nitida;* June 8, spermogonia; June 15, aecidia.

Whether the failure to infect *R. lucida* was due to the greater mechanical resistence of the firm leaves, or to a physiological difference in the host can not be stated, but I am inclined to favor the former explanation.

3. PUCCINIA HELIANTHI Schw.— Three collections of sunflower-rust were used for cultures this season. A collection was obtained from Spirit Lake, Iowa, on *Helianthus laetiflorus*, one from Fair Oaks, in northern Indiana, on *H. mollis*, and one from Lafayette, Ind., on *H. grosse-serratus*, all by the writer. Another collection was used, but the host could not be determined with certainty, and the results are discarded. Three collections seemed to be in perfect condition, but could not be made to germinate. Forty sowings were made from the three collections used, and as a large space would be required to report the full data, the results will be given in tabular form. In this table decided and complete results are shown by an exclamation point, infection which was meager, grew slowly and gave no aecidia or very few, is shown by a semicolon, a sowing which gave no infection is indicated by a single period, and where no sowings were made a dash is used. Fifteen

[9] Jour. Mycol. 10:13. 1904.
[10] Bot. Gaz. 29:271. 1900.
[11] Bot. Gaz. 35:17. 1903.

species of *Helianthus* were employed, on which to sow the teleutospores.

CULTURES OF HELIANTHUS RUST.

Hosts for cultures	Source of teleutosporic material H. mollis	H. grosse-serratus	H. laetiflorus
1. H. annuus	!	!	!
2. H. decapetalus	–	.	–
3. H. divaricatus	–	–	;
4. H. grosse-serratus	.	!	.
5. H. hirsutus	;	.	.
6. H. Kellermani	.	–	;
7. H. laetiflorus	.	.	!
8. H. Maximiliani	.	.	–
9. H. mollis	!	.	;
10. H. occidentalis	;	.	;
11. H. orgyalis	.	.	.
12. H. scaberrimus	.	.	!
13. H. strumosus	;	.	.
14. H. tomentosus	;	;	;
15. H. tuberosus	.	.	.

! Abundant infection.
; Infection, but slow growth and few or no aecidia formed.
. No infection.
– Not sown.

The results of this year accord closely with those of 1902 and 1903. In 1902 some success was attained in sowing spores from *H. grosse-serratus* on *H. Maximiliani*, but no success this year. In 1903 sowing spores from *H. mollis* on *H. strumosus* gave no infection, this year a few spermogonia were formed, but no further development took place. In all other respects the work of the three years is in perfect accord. Altogether sixty-four sowings have been made.

Looking over the accompanying table it will be seen that each set of spores grew upon the species of host from which derived, but not upon the other two species, except that spores from *H. laetiflorus* sown on *H. mollis* gave a tardy showing of spermogonia, without further development. Also each set of spores grew luxuriantly upon *H. annuus*, and each made a feeble growth upon *H. tomentosus*, but on all other species they either failed to infect or made a feeble growth, with the single exception that spores from *H. laetiflorus* grew well on *H. scaberrimus*.

From all results so far available, it seems that the following conclusion may safely be drawn. *Puccinia Helianthi* Schw. is a single species, having many races, for which *H. annuus* acts as a bridging host.

4. PUCCINIA SUBNITENS Diet.— Teleutosporic material of this species on *Distichlis spicata* (L.) Greene was sent from Nebraska by Rev. J. M. Bates, to whom I am also indebted for suggestions which led to one of the most interesting series of cultures yet made. In a communication dated April 30, 1904,

Rev. Bates says: "Last spring I found *Æcidium* on *Cleome serrulata* in two nearby localities, and on *Chenopodium album*, closely associated with the rust on *Distichlis spicata*, and no other. Now I have it again under same conditions. I wrote Mr. Holway about it and shocked him; he does not think it possible. But I am well convinced that it is the same as on Chenopodium" [proved by cultures in 1902 from Distichlis-rust sent by Rev. Bates]. Further reasons were given for believing that the *Cleome* and *Chenopodium* aecidia came from teleutospores on *Distichlis*, among them being that "last year I watched for the uredo from it on the *Distichlis*, and got it May 21, after collecting the first *Cleome* aecidia May 5." All these observations seemed very convincing, yet the deductions seemed very improbable. He followed up the statements by sending seedling plants of *Cleome serrulata* and *Chenopodium album* on which the large, brilliant orange-colored aecidia occurred in remarkable profusion, and so much alike that in appearance and structure they had to be pronounced identical. As the season progressed Rev. Bates also sent freshly collected specimens of aecidia on *Roripa sinuata* (Nutt.) Hitch., *Sophia incisa* (Engelm.) Greene, and *Salsola Tragus* L., which he considered belonged to the same inclusive species. The results of my cultures confirm the above clever observations, and add still other hosts for the aecidium. The data are as follows:

May 17, Sown on *Chenopodium album;* May 25, spermogonia; June 5, aecidia.

May 17, Sown on *Cleome spinosa;* May 25, spermogonia; May 30, aecidia.

May 17, Sown on *Lepidium apetalum;* May 25, spermogonia; June 7, aecidia.

May 30, Sown on *Lepidium Virginicum;* June 7, spermogonia; June 16, aecidia.

May 30, Sown on *Sophia incisa;* June 7, spermogonia; plant injured.

May 30, Sown on *Erysimum asperum;* June 5, spermogonia; June 14, aecidia.

May 30, Sown on *Cleome spinosa;* June 5, spermogonia; June 14, aecidia.

We have here a demonstration of the remarkable fact, not known for any other species of rust so far as I recall, that *Puccinia subnitens* with teleutospores on *Distichlis spicata* has aecidia growing with equal vigor upon species belonging to three families of plants. The teleutospores for the above sowings were all taken from the same collection, and from only a few leaves of the grass, which precludes the possibility of a differentiation in the teleutoform, or any division into races. The aecidium is unusually well marked. Going over my herbarium and taking out the forms which are identical with this species, beyond a doubt, and adding to those already mentioned, we have the following hosts and distribution for the aecidium of this species.

Puccinia subnitens Diet.

On Chenopodiaceae:

Chenopodium album L. Montana, New Mexico, Nebraska.
Chenopodium leptophyllum (Moq.) Nutt. Nebraska.
Chenopodium glaucum L. Montana.
Salsola Tragus L. Nebraska.

On Capparidaceae:

Cleome serrulata Pursh. Nebraska, Montana.
Cleomella parviflora A. Gr. Nevada.

On Cruciferae:

Lepidium apetalum Willd. Nebraska, Montana.
Roripa sinuata (Nutt.) Hitch. Nebraska.
Sophia incisa (Engelm.) Greene. Nebraska.
Stanleya pinnata (Pursh.) Britt. Colorado.

5. PUCCINIA PANICI Diet.—The connection of this rust with *Æcidium Pammelii* Trel. on *Euphorbia corollata* L. was reported by William Stuart[12] based on somewhat meager but seemingly convincing cultures made in 1901. Teleutosporic material for the present trial was obtained at Fair Oaks, Ind., on *Panicum virgatum*. It was sown on *Euphorbia corollata* May 16, and again May 24, and both sowings showed the most abundant results, giving the first spermogonia respectively on May 24 and June 1, and aecidia May 30 and June 9. There can be no doubt that these two forms are members of one species. While at Lafayette the rust is very rare, at Fair oaks it is exceedingly abundant on both the *Panicum* and the *Euphorbia*. It is one of the few glumaceous rusts observed by the writer, having so nearly an equal display of both the aecidial and teleutosporic forms. The aecidial form having first been published, requires the name to be written PUCCINIA PAMMELII (Trel.) nom. nov.

6. PUCCINIA VERBENICOLA (E. & K.) Arth.—Previous cultures[13] with this species were verified by sowing teleutospores, from *Sporobolus longifolius* sent by Rev. J. M. Bates from Red Cloud, Neb., on *Verbena urticaefolia*, May 16, resulting in spermogonia May 23 and aecidia May 30. Also another successful culture was made with similar material sent by Mr. E. Bartholomew from Stockton, Kans., sown on *V. urticaefolia* June 3, showing spermogonia June 11, and aecidia June 18.

7. PUCCINIA WINDSORIAE Schw.—Teleutospores from *Tricuspis seslerioides* Torr., Lafayette, Ind., were sown May 19, on *Ptelea trifoliata* and *Xanthoxylum Americanum*, both members of the family *Rutaceae*, and both known to be hosts to an aecidium. Although the conditions were exceptionally favorable, no infection resulted on *Xanthoxylum*, while *Ptelea*

[12] Proc. Ind. Acad. Sci. for 1901:284. 1902.
[13] Bot. Gaz. 29:274. 1900, and 35:16. 1903.

gave spermogonia May 25, and aecidia May 31, in accordance with results heretofore obtained.[14]

8. PUCCINIA FRAXINATA (Schw.) Arth.— Cultures of this species were successfully carried out in 1899,[15] showing that the aecidium occurs upon *Fraxinus*. As similar aecidia have been collected upon *Ligustrum vulgare* L., in New York, and *Adelia segregata* (Jacq.) Small (*Forestiera porulosa* Poir.) in Florida,[16] members of the family *Oleaceae*, to which *Fraxinus* belongs, a number of trials were made to see if the number of hosts could be extended. Teleutosporic material was obtained at Spirit Lake, Iowa, on *Spartina cynosuroides*. Sowings were made on *Ligustrum vulgare* (2), *Ligustrum ovalifolium* (2), *Syringa vulgaris* (2), *Chionanthus Virginica* (2), *Adelia acuminata*, *Adelia ligustrina*, and *Fraxinus lanceolata*, all members of the family Oleaceae, yet no infection took place except on the last host. Although the conditions for success were seemingly excellent, still I am not fully convinced that some of these failures were not due to accident. I am under obligation to Dr. George V. Nash, of the N. Y. Bot. Garden, for a plant of *Adelia acuminata*, sent from the Garden for this culture work.

9. PUCCINIA IMPATIENTIS (Schw.) Arth.—Teleutosporic material on *Elymus Virginicus* was sent from Racine, Wis., by Dr. J. J. Davis, and sown May 7, on *Clematis Virginiana* and *Impatiens aurea*. The first gave no infection, the second showed spermogonia May 14, and aecidia May 23.[17]

10. PUCCINIA POCULIFORMIS (Jacq.) Wettst.—Teleutosporic material was found at Spirit Lake, Iowa, on *Elymus Canadensis* L., and without a careful examination was sown on *Clematis Virginiana* (2), *C. Scottii*, *Cimicifuga Americana*, *C. racemosa*, *Actaea alba*, and *Impatiens aurea*, with no infection. A microscopic study revealed the nature of the rust, and it was sown upon *Berberis vulgaris* May 18, with abundant infection, spermogonia appearing May 25, and aecidia duly following, but not recorded until June 9. Teleutosporic material was also found at Spirit Lake, Iowa, on *Agropyron tenerum*, and was sown on *Berberis vulgaris* May 10, giving an abundant infection, first showing spermogonia May 17, followed in due time by aecidia. Teleutosporic material on *Agropyron repens* was sent from Burlington, Vt., by Mr. William Stuart, and sown on *Berberis vulgaris* May 11. Spermogonia appeared May 18, but the leaves were injured before aecidia developed.

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[14] Bot. Gaz. 29:273. 1900, and 35:16. 1903.

[15] Bot. Gaz. 29:275. 1900.

[16] Specimen in herbarium of N. Y. Bot. Garden, and cited by Sydow, Monog. Ured. 1:808, under the erroneous name *F. "paludosa"*.

[17] For previous cultures see Bot. Gaz. 35:18. 1903, and Jour. Mycol. 10:11. 1904.

11. Puccinia Rhamni (Pers.) Wettst.—A number of bushes grow in the garden near the laboratory of *Rhamnus lanceolata, R. Caroliniana*, and *R. Cathartica*, on which aecidia appeared this season, not very plentifully, but in about equal abundance. Seedlings of *Avena sativa* were infected from all three sources. Æcidiospores were sown from *R. lanceolata* May 15, from *R. Caroliniana* May 19, and from *R. Cathartica* May 20. In each case uredospores appeared in abundance in about a week, the exact date not being recorded.

12. Puccinia angustata Peck.—Teleutospores gathered on *Scirpus atrovirens*, Lafayette, Ind., were sown May 12, on *Lycopus Americanus*, giving spermogonia May 20, and aecidia May 27, further confirming previous cultures.[18]

13. Puccinia Peckii (DeT.) Kellerm.—Successful sowings[19] of teleutospores from undetermined species of *Carex* were made on *Onagra biennis*, from material sent by Rev. J. M. Bates of Red Cloud, Neb., and by Dr. J. J. Davis of Racine, Wis. A sowing was also made, May 20, on *O. biennis*, from material on *C. lanuginosa* sent by Rev. Bates from Red Cloud, Neb., which gave spermogonia May 29, and aecidia June 5. The same material was sown on *Urtica gracilis* twice without success. This gives a new host for the fungus.

Teleutosporic material on *Carex trichocarpa* from the type locality of *Puccinia Bolleyana*, was sown May 6, on *Onagra biennis* and *Sambucus Canadensis*, producing infection on both hosts, and thus repeating the experience of 1902.[20] The *Carex* bore teleutospores of both *P. Peckii* and *P. Sambuci* (Schw.) Arth. intermixed, as was easily verified by microscopic examination.

14. Puccinia Caricis-Erigerontis Arth.—Teleutospores gathered at Lafayette, Ind., on *Carex festucacea* were sown on *Erigeron annuus*, May 12, giving heavy infection of spermogonia May 20, and of aecidia May 27. Similar material on the same host, sent by Rev. Bates from Red Cloud, Neb., was sown May 25, on *E. annuus*, and gave spermogonia June 2, and aecidia June 9. These results confirm previous work.[21]

15. Puccinia albiperidia Arth. While the conviction is gaining ground that the aecidium of this species is the common aecidium on gooseberries, yet the excellent results of this year do not give any particular support to the view. All the aecidia grown in cultures were small and pale, and apparently

[18] Bot. Gaz. 29:273. 1900, and Jour. Mycol. 8:53. 1902.

[19] For previous cultures see Jour. Mycol. 8:55. 1902, and Bot. Gaz. 35:13. 1903.

[20] Bot. Gaz. 35:14. 1903.

[21] Jour. Mycol. 8:53. 1902, and Bot. Gaz. 35:15. 1903.

dissimilar to the bright orange-yellow aecidia on *Ribes* in the fields.

Teleutosporic material was sent by Dr. J. J. Davis from Racine, Wis., on *Carex gracillima*, which was sown on *Ribes floridum* (3), *R. rubrum*, and *R. aureum* (2), with no infection, except that in one case a few spermogonia appeared on *R. aureum* after eleven days, but reached no further development. It was also sown with abundant success on *R. Uva-crispa* (2), *R. Cynosbati* and *R. rotundifolium* (2), thus confirming previous work.[22]

Excellent teleutosporic material was found on *Carex crinita* Lam., Lafayette, Ind., and sown May 7, on *Ribes rubrum*, with no infection, on *R. Uva-crispa*, with weak infection, the plant being in poor condition, and on *R. rotundifolium* with strong infection, showing spermogonia May 17, and aecidia May 25. Another equally strong infection was secured with a sowing on the last host June 3. This culture adds another teleutosporic host.

16. PUCCINIA POLYGONI-AMPHIBII Pers. In previous years[23] this rust was sown upon three species of *Polygonum* and *Cicuta maculata* with no infection. After learning of Dr. Tranzschel's successful cultures on two European species of wild geranium[24] considerable effort was made to secure teleutosporic material with which to repeat the work. No rust could be found about Lafayette where it usually occurred. At Spirit Lake, Iowa, a diligent search where it had previously been common, only gave a few slightly rusted leaves. No better success was met with at Fair Oaks, Ind. An appeal to my excellent coadjutors, Prof. W. A. Kellerman, Columbus, Ohio, Rev. J. M. Bates, Red Cloud, Neb., and Dr. J. J. Davis, Racine, Wis., brought out the same experience, and only added a few slightly rusted leaves from Wisconsin. The three meager collections were, however, useless, as none of the teleutospores would germinate. I then waited for aecidia to appear on geranium and found them as rare as the teleutospores had been. Finally I obtained a few belated aecidia on *Geranium maculatum* L. (*AE. sanguinolentum* Lindl.) and sowed them on *Polygonum emersum* (Michx.) Britt., June 11, and on June 19, uredospores appeared, and eventually on Aug. 17, teleutospores began to form, the plants being kept in the greenhouse during the culture. The American and European forms e therefore identical.

[22] Jour. Mycol. 8:53. 1902, and 10:11. 1904.
[23] Bot. Gaz. 35:12. 1903, and Jour. Mycol. 10:9. 1904.
[24] Centr. f. Bakt. 11[2]:106. 1903.

In addition to the foregoing results five species of rusts were grown, establishing aecidial and teleutosporic connections, not heretofore recorded. The species are heteroecious with one exception.

1. Melampsora Bigelowii Thüm. — Three collections of teleutospores on *Salix* were secured, but only one, which was obtained at Racine, Wis., on *Salix amygdaloides* Anders., and forwarded by Dr. J. J. Davis, could be made to germinate. This was sown, May 10, on *Larix decidua* Mill., and twenty days later both spermogonia and aecidia were observed in abundance, although they had probably first made their appearance some days earlier. On the same date it was sown on *Euonymus obovatus* without result. A further sowing on *Larix decidua* was made on May 25, and on June 4 spermogonia began to appear in great abundance, followed on June 10 by an equal abundance of aecidia. The aecidia are of the typical caeoma-form, and are very similar to those of *Melampsora Medusae*, the chief difference being in the spores, which are somewhat more distinctly and coarsely verrucose than in the poplar form.

The only American collections of aecidia on *Larix*, that have come to my attention, were made by E. W. D. Holway at Mt. Temple, Aug. 22, 1902, and Laggan, Aug. 23, 1902, both places in Alberta, Canada, and both collections on *Larix Lyallii* Parl. These collections agree perfectly with the aecidia raised in cultures. A comparison of the numerous collections of willow rust in my own herbarium, numbering 80 packets, and representing all sections of the United States and Canada from the Atlantic to the Pacific, shows that both the uredosporic and teleutosporic stages agree closely with one another, and with those on the material used in the culture.

A comparison with European collections shows the American form to be very different from any European species. The ...est approach to the American form is *Melampsora Larici-*... Kleb., the most common willow rust of Europe. The ...iffer, however, in a very marked way. The American ...has all three sorts of spores considerably larger, the spores ...e aecidia and uredo have walls twice as thick, the pores ...far more evident, and the papillae on the surface are much ...ser together.

The name which I have adopted for this common willow rust was given by Baron von Thuemen to a collection made in California on *Salix Bigelowii*, which he stated had been received from the herbarium of Dr. W. G. Farlow. Von Thuemen's herbarium was burned some years ago, and the type is consequently destroyed. In reply to an inquiry regarding the matter, Dr. Farlow states that he does not recall sending such a specimen to von Thuemen, and is unable to find a correspond-

ing specimen in his herbarium, unless one from Santa Cruz, Calif., collected by Dr. C. L. Anderson, November, 1875, could be the one intended. This specimen, however, is said to be upon *Salix brachystachys.*

Although the type collection can not be accurately identified or duplicated, there seems to be no reason to question the reference of the fungus described to the common willow rust growing throughout California and the other parts of North America. Dr. Farlow kindly sent me a part of his specimen on *S. brachystachys*, and also a specimen on *S. Bigelowii*, collected in Washington by C. V. Piper in 1899, and they agree in all essential particulars with the eastern collections on willow.

I have also had the privilege, through the kindness of Mr. Chas. H. Peck, of examining the type specimen of *Lecythea macrosora* Pk. (Bot. Gaz. 5:35. 1880), collected in Colorado by Brandegee, and thought to be on *Epiliobium*, and find that it is the uredostage of this same species of willow rust. An examination of type material of *Melampsora paradoxa* D. & H. shows no important deviation from the common form. The peculiar free teleutospores figured by Dr. Dietel (Hedw. Beibl. 40:33. 1901) appear to be occasional reversional forms, due to disturbed nutrition or some such cause. Similar isolated teleutospores have been described by Klebahn in European material (Ztschr. f. Pf.-Kr. 9:98). The name, *Melampsora maculosa* D. & H., is *nomen nudum.* It was applied to forms showing especially bright yellow discoloration of the leaf about the uredosori, but without other marked characters, as examination of type material shows.

The species may be characterized as follows:

MELAMPSORA BIGELOWII Thuem.

0. Spermogonia amphigenous, scattered, or somewhat gregarious, minute, punctiform, pale yellow, inconspicuous, subcuticular, conical, 60–80 μ in diameter, 40–45 μ high.

I. Aecidia chiefly hypophyllous, scattered or somewhat gregarious, small, .1–.2 mm. across, oblong, pale yellow fading to white, inconspicuous, formed between the epidermis and mesophyll, soon naked, pulverulent; aecidiospores globoid, 15–22 by 18–27 μ; wall colorless, 2–3 μ thick, finely and evenly verrucose, with distinct papillae, pores scattered, noticeable.

On *Larix Lyallii* Parl., Alberta, Can., and probably on other species of *Larix* in various parts of the United States and Canada. Cultivated on *L. decidua* Mill. and *L. laricina* (DuR.) Koch.

II. Uredosori chiefly hypophyllous, usually on conspicuous yellow spots, scattered or gregarious, round, .3–.5 mm. across, orange-yellow fading to pale yellow, soon naked, somewhat pulverulent; uredospores globoid, 15–19 by 17–24 μ, wall colorless, 2.5–3.5 μ thick, sparsely and evenly verrucose, pores scattered, noticeable; paraphyses intermixed with the spores, capitate, smooth, 50–70 μ long, heads 22–25 μ broad, wall 3–5 μ thick, peripheral paraphyses thinner walled and more clavate.

III. Teleutosori amphigenous, or sometimes partly or wholly epiphyllous or hypophyllous, scattered, roundish or irregular, about .5 mm. across, often confluent, orange-yellow becoming yellowish or purplish

brown, subepidermal; teleutospores prismatic or oblong, 11–14 by 29–42 µ, rounded at both ends; wall cinnamon-brown, smooth, uniformly 1 µ thick.

On *Salix amygdaloides* Anders., and many other species of Salix, throughout the United States and Canada.

Beside this common willow rust, another is known to occur on *Salix herbacea* L. in Greenland and on Mt. Washington, N. H., *Melampsora artica* Rostr. One other, *Melampsora repentis* Plowr., on *Salix repens* has been reported from North America, but has not been seen by the writer.

2. PUCCINIA TOMIPARA Trel. — I am indebted to Mr. E. W. D. Holway for the suggestion, which led to the certain demonstration of the aecidial connection for this species. Mr. Holway's observations were made in the field, and showed such close association of the recently germinated teleutospores on over-wintered leaves of *Bromus ciliatus* and the appearing aecidia on *Clematis Virginiana*, that the conclusion seemed foregone. His direct observations extended over two seasons. Teleutosporic material gathered by Mr. Holway at Decorah, Iowa, was sown on *Impatiens aurea, Dirca palustris, Clematis Virginiana, C. Fremontii, C. Scottii, C. Viorna*, and with no infection except on *Clematis Virginiana*. Teleutosporic material of *Bromus ciliatus* was kindly sent by Dr. J. J. Davis from Kenosha Co., Wis., and sown on *Clematis Virginiana* with most abundant infection. Material was also used, obtained near Lafayette, Ind., on *Bromus ciliatus*, and sown on *Dirca palustris* and *Clematis Virginiana* with no infection of the former and the most plentiful infection of the latter. The record of dates is as follows:

May 12, Teleutospores (Iowa) sown on *Impatiens aurea;* no infection.
May 12, Teleutospores (Iowa) sown on *Dirca palustris;* no infection.
May 12, Teleutospores (Iowa) sown on *Clematis Scottii;* no infection.
May 12, Teleutospores (Iowa) sown on *Clematis Fremontii;* no infection.
May 12, Teleutospores (Iowa) sown on *Clematis Virginiana;* May 19, spermogonia; May 28, aecidia.
May 18, Teleutospores (Ind.) sown on *Dirca palustris;* no infection.
May 25, Teleutospores (Iowa) sown on *Clematis Scottii;* no infection.
May 25, Teleutospores (Iowa) sown on *Clematis Fremontii;* no infection.
May 25, Teleutospores (Iowa) sown on *Clematis Viorna;* no infection.
May 25, Teleutospores (Iowa) sown on *Clematis Virginiana;* May 31, spermogonia; June 9, aecidia.
May 30, Teleutospores (Ind.) sown on *Dirca palustris;* no infection.
May 30, Teleutospores (Ind.) sown on *Clematis Virginiana;* June 7, spermogonia; June 15, aecidia.
June 3, Teleutospores (Wis.) sown on *Clematis Virginiana;* June 9, spermogonia; June 16, aecidia.

This record shows that the report made last year, connecting the teleutosporic stage on *Bromus ciliatus* with the aecidium on *Dirca palustris*[25] was a mistake. The teleutosporic material from Lafayette, which grew so abundantly on *Clematis Virginiana* this year, came from the same plants that

[25] Jour. Mycol. 10:49. 1904.

were mentioned as bearing teleutospores a year ago, and standing near aecidium-laden bushes of *Dirca palustris.* Last year's supposed results, which were based on a single sowing of aecidiospores, can be explained by supposing that the *Bromus* plants were already infected when brought into the laboratory. The above plentiful data show no escape from the conclusion that the common *Bromus* rust belongs to the aecidium on *Clematis Virginiana,* and *not* to the aecidium on *Dirca palustris.* The name *Puccinia hydnoidea* (B. & C.) Arth., therefore, does not belong to the *Bromus* rust, but to some teleutosporic form not yet identified. The descriptions of uredospores and teleutospores given at the place cited belong to *Puccinia tomipara* Trel.

There are at least three species of aecidia found upon *Clematis* in the United States. *Aecidium occidentale* Arth. occurs on *C. Douglasii* in the northwestern region; its teleutosporic connection is not known. *Aecidium Clematidis* DC., found on *C. ligusticifolia, C. Scottii, C. Fremontii, C. Drummondii, C. lasiantha* and *C. Viorna,* ranging from Iowa to Montana and southwestward to the Pacific coast, is the first stage of *Puccinnia Agropyri* E. & E. The third species is *Aecidium Clematitis* Schw., the one under consideration, found on *C. Virginiana,* ranging throughout the United States and Canada east of the Rocky mountains, and belongs to *Puccinia tomipara* Trel. It has larger spermogonia, and somewhat smaller aecidia and aecidiospores than that of *P. Agropyri.* It may be characterized as follows:

Aecidium Clematitis Schw.

0. Spermogonia epiphyllous, in small groups, honey-yellow, punctiform, subepidermal, globose, 90–140 μ in diameter; ostiolar filaments 40–60 μ long.

I. Aecidia hypophyllous, in orbicular groups, crowded; peridia low, margin somewhat revolute, erose; aecidiospores globoid, 16–22 by 18–26 μ, wall rather thin, 2 μ, colorless, minutely verrucose.

The teleutospores used in the cultures were all of the normal two-celled form. The original collection on which the name was based does not appear to differ in any appreciable way from the usual two-celled form except in the many-celled teleutospores, which appear to be variations not uncommon in many grass species. The hosts of all three collections used in the cultures were of the form often made a distinct species under the name *Bromus purgans* L., which differs but slightly, chiefly in pubescence, from the typical *B. ciliatus.*

3. Puccinia Stipae Arth. — On May 9, 1903, I found at Spirit Lake, Iowa, spermogonia and young aecidia on leaves near the ground of *Aster multiflorus,* with germinated teleutospores on old leaves of *Stipa spartea* within a few feet, and no other grass or sedge rust noticeable for a considerable distance

about. I was unable to secure material to carry forward this suggestive observation until the season following. Teleutosporic material was obtained at Spirit Lake, Iowa, and on May 9, 1904, was sown on *Aster ericoides*, which gave very abundant spermogonia on May 18, and strong aecidia on May 27. A second sowing was made on May 13 and another on May 21, which gave marked results with *Aster multiflorus* and *A. Novae-Angliae*, but no infection with *A. cordifolius*, *A. Drummondii*, *A. paniculatus* and *A. sericeus*, although the host plants were in vigorous growing condition. The data for these sowings are as follows:

May 9, Teleutospores sown on *Aster ericoides;* May 18, spermogonia; May 27, aecidia.
May 13, Teleutospores sown on *Aster multiflorus;* May 23, spermogonia; May 28, aecidia.
May 13, Teleutospores sown on *Aster cordifolius;* no infection.
May 21, Teleutospores sown on *Aster multiflorus;* May 29, spermogonia; June 4, aecidia.
May 21, Teleutospores sown on *Aster Novae Angliae;* May 27, spermogonia; June 3, aecidia.
May 21, Teleutospores sown on *Aster Drummondii;* no infection.
May 21, Teleutospores sown on *Aster paniculatus;* no infection.
May 21, Teleutospores sown on *Aster sericeus;* no infection.

The spermogonia and aecidia of this species are wholly unlike those of the common *Carex* rust, both in general appearance and microscopic characters. The leaves of the host are thickened and more or less distorted by the fungus, and the aecidia have the pustular appearance of *AE. recedens* on *Solidago*, *AE. hemisphericum* on *Lactuca*, and other Composite-species having very delicate peridia, or none. The spores instead of being a bright orange-yellow, as in most aecidia, are decidedly brown. It is a very distinctive form, and yet I have been unable to learn of but one collection having been made, beside my own. It was found on *Aster multiflorus*, Bourbon Co., Kans., May 29, 1902, by A. O. Garrett, who kindly sent me a specimen.

Finding the aecidium of *Puccinia Stipae* shows that the American species is wholly distinct from the European species on Stipa, which Bubak has proven by cultures belongs to an aecidium on the Labiate-genus *Thymus*. The aecidium does not attack all species of *Aster* alike, but judging from present cultural results, can be expected on the suffrutescent forms having coarse narrow leaves of firm texture. Such species may represent a natural group within the genus, but if so the taxonomists have not defined it. It is somewhat more probable that they represent an ecological group adapted to a dry atmosphere. The aecidium has not been characterized, and therefore a description is appended.

PUCCINIA STIPAE Arth.

0. Spermogonia amphigenous, irregularly grouped, punctiform, brownish orange, subepidermal, globoid, 95–110 μ in diameter; ostiolar filaments free, 35-50 μ long.

I. Aecidia amphigenous, in irregular groups, on hypertrophied spots, brownish orange, small; peridia low, fragile and evanescent, cells abutted or slightly imbricated, smooth outside, tuberculate inside, thin walled; aecidiospores globose, 18–25 μ in diameter, wall medium thick, 1–2 μ, brownish yellow, closely and finely verrucose, pores many, scattered, often conspicuous.

On *Aster multiflorus* Ait., Iowa and Kansas, and also cultivated on *A. ericoides* L., and *A. Novae-Angliae* L.

4. PUCCINIA SORGHI Schw.— Through a fortunate observation in the field, June 2, 1904, upon finding aecidia on *Oxalis cymosa* Small, the attempt was made to grow the aecidiospores on young corn plants, which resulted in complete success. On June 2, aecidia-bearing leaves were suspended over potted corn plants, under a large bell jar. On June 10 uredosori broke through the epidermis, and on July 10 teleutosori began to appear. This is taken as demonstrating the genetic connection of *Æcidium Oxalidis* Thuem. and *Puccinia Sorghi* Schw.

A detailed account of this culture, with citation of all collections of the aecidium on various species of *Oxalis*, known to the writer, has already been published in the Botanical Gazette (38:64-67. 1904).

5. PUCCINIA PODOPHYLLI SCHW.—This autoecious species of rust is very common in the vicinity of Lafayete, Ind. Leaves bearing recently opened aecidia were placed above the leaves of two potted plants on May 7, and both kept under bell-jars for three days. On May 23, one plant began to show teleutospores, and, on May 20, the other plant exhibited many whitish spots which began to burst open and display teleutospores on May 24. Both plants proved to be heavily infected over large areas of the leaves.

The principal interest in this culture comes from the fact that the sowing of aecidiospores did not give rise to secondary aecidia, but exclusively to the characteristic teleutospores. Sydow in his Monog. Uredinearum (1:526) states that this species has primary and secondary aecidia, the former being more common and forming extended groups, the latter coming later with the teleutospores and are sparsely distributed with few together in small groups. As many similar species of rusts have repeating aecidia, it would be natural to suppose that in this case the secondary generation arose from the aecidiospores of the first generation. The culture was made from a luxuriant development of the primary form; and from the fact that no secondary aecidia appeared, I think it can be safely assumed, that the so-called secondary generation arises, generally at least, from teleutospores, and its sparse distribution is due to the smaller number of sporidia which strike the leaf, or to

the inhibition of maturer tissues in the leaf. So far as this culture can be taken as evidence, it shows that a true secondary generation of the aecidium probably does not occur in *P. Podophylli.*

SUMMARY.

The following is a complete list of successful cultures made during the season of 1904. It is divided into the two series: species previously reported by the writer or other investigators, and species now reported for the first time.

A. Species previously reported.

1. MELAMPSORA MEDUSAE Thuem.—Teleutospores from *Populus deltoides* Marsh. and *P. tremuloides* Michx. sown on *Larix decidua* Mill., and from *P. deltoides* Marsh. sown on *L. laricina* (Du R.) Koch.

2. PHRAGMIDIUM SPECIOSUM Fr. —Teleutospores from *Rosa Arkansana* Port. sown on *R. Arkansana* Port., *R. humilis* Marsh., *R. Carolina* L., and *R. nitida* Willd.

3. PUCCINIA HELIANTHI Schw.—Teleutospores from *Helianthus mollis* Lam. sown on *H. annuus* L. and *H. mollis* Lam. with abundant infection, and on *H. hirsutus* Raf., *H. occidentalis* Ridd., *H. strumosus* L., and *H. tomentosus* Michx. with slight infection; from *H. grosse-serratus* Mart. sown on *H. annuus* L., and *H. grosse-serratus* Mart. with abundant infection, and on *H. tomentosus* Michx. with slight infection; and from *H. laetiflorus* Pers. sown on *H. annuus* L., *H. laetiflorus* Pers., and *H. scaberrimus* Ell. with abundant infection, and on *H. divaricatus* L., *H. Kellermani* Britton, *H. mollis* Lam., *H. occidentalis* Ridd., and *H. tomentosus* Michx. with slight infection.

4. PUCCINIA SUBNITENS Diet.—Teleutospores from *Distichlis spicata* (L.) Greene were sown on *Chenopodium album* L., *Cleome spinosa* L., *Lepidium apetalum* Willd., *L. Virginicum* L., *Sophia incisa* (Engelm.) Greene, and *Erysimum asperum* DC.

5. PUCCINIA PAMMELII (Trel.) Arth.—Teleutospores from *Panicum virgatum* L., sown on *Euphorbia corollata* L.

6. PUCCINIA VERBENICOLA (E. & K.) Arth.—Teleutospores from *Sporobolus longifolius* (Torr.) Wood sown on *Verbena urticaefolia* L.

7. PUCCINIA WINDSORIAE Schw.—Teleutospores on *Tricuspis seslerioides* Torr. sown on *Ptelea trifoliata* L.

8. PUCCINIA FRAXINATA (Schw.) Arth.—Teleutospores on *Spartina cynosuroides* Willd. sown on *Fraxinus lanceolata* Borck.

9. PUCCINIA IMPATIENTIS (Schw.) Arth.—Teleutospores on *Elymus Virginicus* L. sown on *Impatiens aurea* Muhl.

10. Puccinia poculiformis (Jacq.) Wettst.— Teleutospores on *Elymus Canadensis* L., *Agropyron tenerum* Vasey and *A. repens* (L.) Beauv. sown on *Berberis vulgaris* L.

11. Puccinia Rhamni (Pers.) Wettst.— Æcidiospores on *Rhamnus lanceolata* Pursh. *R. Caroliniana* Walt., and *R. Cathartica* L., sown on *Avena sativa* L.

12. Puccinia angustata Peck.— Teleutospores on *Scirpus atrovirens* Muhl. sown on *Lycopus Americanus* Muhl.

13. Puccinia Peckii (DeT.) Kellerm.— Teleutospores on *Carex lanuginosa* Michx., and *C. trichocarpa* Muhl. sown on *Onagra biennis* (L.) Scop.

14. Puccinia Caricis-Erigerontis Arth.— Teleutospores on *Carex festucacea* Willd. sown on *Erigeron annuus* (L.) Pers.

15. Puccinia albiperidia Arth.— Teleutospores on *Carex gracillima* Schw. sown on *Ribes Uva-crispa* L., *R. Cynosbati* L., and *R. rotundifolium* Michx., with a slight infection on *R. aureum* Pursh; and on *C. crinita* Lam. sown on *R. Uva-crispa* L. and *R. rotundifolium* Michx.

16. Puccinia Polygoni-amphibii Pers.— Æcidiospores on *Geranium maculatum* L. sown on *Polygonum emersum* (Michx.) Britt.

B. Species reported now for the first time.

1. Melampsora Bigelowii Thüm. — Teleutospores on *Salix amygdaloides* Anders. sown on *Larix decidua* Mill.

2. Puccinia tomipara Trel.— Teleutospores on *Bromus ciliatus* L. sown on *Clematis Virginiana* L.

3. Puccinia Stipae Arth.— Teleutospores on *Stipa spartea* Trin. sown on *Aster multiflorus* Ait., *A. ericoides* L., and *A. Novae-Angliae* L.

4. Puccinia Sorghi Schw.—Æcidiospores on *Oxalis cymosa* Small sown on *Zea Mays* L.

5. Puccinia Podophylli Schw.—Æcidiospores on *Podophyllum peltatum* L. sown on same host.

Purdue University, Lafayette, Ind.

FIRST SUPPLEMENT TO NEW GENERA OF FUNGI PUBLISHED SINCE THE YEAR 1900, WITH CITATION AND ORIGINAL DESCRIPTIONS.

COMPILED BY W. A. KELLERMAN AND P. L. RICKER.

Most of the Genera here reproduced were published during the year 1904. In our previous list a few, of date since Jan. 1, 1904, were by accident omitted; these are here included. The Second Supplement will contain all new genera that may be proposed during the current year. The co-operation of authors is solicited — especially when a genus is published in a foreign periodical that is not widely distributed. Authors will oblige us by sending a copy promptly.

[Myxomycetae]

IOCRATERIUM E. Jahn *n. g.* Myxomycetae. Hedwigia, 43: 302. 12 Juni 1904.

"Iocraterium rubescens (Rex) nov. gen. No. 2671. Mit der vorigen Art vergesellschaftet. (Fig. 1.)

"Wahrscheinlich identisch mit dem Craterium rubescens, das von Rex nach einem Funde in Louisiana beschrieben worden ist. Später hat Dister ermittelt, dass im Pariser Herbarium aufbewahrte Proben des von Spegazzini aufgestellten Didymium paraguayense zu derselben Art gehören. Herr Lister hat mir die Identität dieser den dritten Fund bildenden Sporangien und der älteren aus Louisiana und Paraguay bestätigt und hinzugefügt, dass die Proben der beiden früheren Funde sich in einem sehr mangelhaften Zustand befinden.

"So erklärt es sich wohl, dass wesentliche Kennzeichen der Art, der Besitz einer echten Columella, bisher übersehen worden ist. Sie ist mit Kalk gefüllt und so zerbrechlich, dass ihre Bruchstücke bei der Präparation leicht für Knoten des Capillitiums und Teile der Sporangienhaut gehalten werden. Ich selbst bin erst nachträglich durch einen Zufall auf die Columella aufmerksam geworden. Am klarsten wird ihr Bau und ihr Ansatz am Stiel, wenn man ein Sporangium mit dem Mikrotom in Längschnitte zerlegt. Man sieht dann, dass der Stiel mit Kalk gefüllt und im oberen Teil von kleinen Maschen eines Faserwerks durchzogen ist. Darauf baut sich die ganz mit dem rosenroten Kalk erfüllte Columella auf (vergl. Fig. 1 C). Von dieser gehen in gewissen Abständen die Capillitiumfäden ab, die sich hier und da zu grösseren Knoten erweitern (Fig. 1 C und 1 D). Auch in ihnen ist der rosenrote Kalk enthalten. Die Columella reicht niemals bis zur Spitze des Sporangiums, sondern lösst sich vorher in eine grosse Zahl von Kalkknoten auf, die in einem etwas dichteren Gewirr von Capillitiumfäden sitzen

"Die Haut des Sporangiums besteht aus einer ziemlich derben schön violett gefärbten Membran, die aussen überall mit den rosenroten Kalkkörnchen bedeckt ist. Eine Aufrisszone für einen Deckel ist nicht vorgebildet.

"Sehr eigentümlich sind die linsenförmigen Kalkkörper, die in der Membran liegen. Sie sind schon von Lister beobachtet worden. Ihr Bau tritt auf Längsschnitten deutlich hervor (Fig. 1 C und 1 E). Die Linse ist innen von der derben, sich nach innen wölbenden violetten Membran, aussen von einer ziemlich zarten Haut begrenzt und ebenfalls auch mit Kalk gefüllt. Oft geht von der Innenhaut ein Capillitiumfaden ab. Hierbei kommt es vor, dass eine Linse nach innen kugelartig aufgetrieben ist. Die zarte Aussenmembran der Linse ist auch aussen noch von einer dünnen Kalkschicht bebedeckt (Fig. 1 E).

"Capillitium und Sporen sind schon von Lister treffend beschrieben worden.

"Die Färbung ist im auffallenden Licht schön violett. Im durchfallenden Licht erscheint die trockene Sporangiehaut prachtvoll rosenrot, feuch (in Glyzerin) ist sie dagegen auch im durchfallendan Licht schön blauviolett. . . .

"Die angeführten Eigentümlichkeiten im Bau der Sporangien (*to ion*, das Veilchen) nenne. Morphologisch ist sie sehr interessant."

[Phycomycetae]

•MYCELOPHAGUS Mangin n. g. Oomycetae. Comptes Rendus des Séances de l'Academie des Sciences, 136:471. 16 Feb. 1903.

"Sur la maladie du Chataigner. . . .

"Le parasite, cause de cette destruction, est un champignon à mycélium délicat dont l'observation a été rendue possible malgré son extreme ténuité, à cause de la présence de la cellulose dans sa membrane, fait assez rare parmi les nombreuses espèces qui pullulent dans le sol. Son mycélium est constitué per de très fins filaments ayant 1μ à 2μ de diamètre, parfois renflés en certains points et atteignant alors 3μ à 4μ; il est très irrégulièrement cloisonné.

"Ce parasite est le plus souvent entièrement immergé dans les mycorhizes, dispersant ses filaments très finement contournés dans le revêtement mycélen de celles-ci ou dans le tissu plus ou moins décomposé de la radicelle; il végète rarement à l'état de liberté dans le sol, ses filaments passant d'une mycorrhize à la suivante au moyen de rameaux divariqués de faible longuer. Toutefois, il peut s'étendre à une grande distance d'un massif de mycorhizes à un autre, mais il emprunte alors pour cheminer un support ou un canal, constitué par les rhizomorphes d'autres espèces. Là, il s'anastomose avec le mycélium des rhizomorphes ou se loge dans l'espace tubulaire qu'ils déterminent, parfois même il pènètre dans les filaments myceliens a l'interieur desquels il s'allonge.

"C'est seulement dans ces rhizomorphes qu'il fructifie, assez rarement á la vérité, puisque j'ai les fructifications trois fois en quatre ans: Aulas (Gard), Saint-Pierreville (Ardèche.)

"Les fructifications se présentent sous l'aspect de masses renflées plus au moins régulièrement, a l'extémité de rameaux latéraux et ayant 6μ à 8μ de large; ce sont là des formes jeunes. Dans d'autres rhizomorphes, les fructifications ont l'aspect de véscicules à parois minces, terminant toujours des rameaux, et ayant 20μ de diamètre en renfermant une spore sphérique à membrane tantôt mince, tantôt très épaisse, ayant toutes les réactions de la callose. Sous cette forme, les fructifications sont identiques aux oospores des Péronosporées."

[Phycomycetae]

SPINALIA Vuillemin n. g. Siphomyceteae. Bulletin de la Société Mycologique de France, 20:32. 25 Feb. 1904.

"Filaments continus; cloisons cicatricielles dans les tubes épuisés. Axe fructifère très long, rampant ou grimpant, redressé en pédicelle.

"Ramification latérale rare et tardive donnant parfois des pédicelles secondaires.

"Tête chargée de rameaux rayonnants, réduits à deux articles nés en direction basifuge; le premier formé, tout en gardant le protoplasme dense et la caducité des spores, révèle un début de différenciation en stérigmate en persistant plus longtemps sur la tête que l'article terminal."

"Spinolia radians sp. nov. . . ."

[Phycomycetae]

UROPHLYCTITES P. Magnus n. g. Chytrididiaceae. Berichte der Deutschen Botanischen Gesellschaft, 21:250. 1903.

"In der englischen botanischen Zeitschrift "The New Phytologist," Vol. II, Nr. 3 (März 1903), S. 49-53, weist F. W. Oliver auf einige an den Blättern fossiler Pflanzen auftretende Bildungen hin, die er auf Grunde seiner genauen, durch instruktive Abbildungen erläuterten Untersuchungen Fiedern von *Alethropteris aquilina* (Schloth.) Goepp. nachgewisenen Parasiten. Auf der Unterseite der Fiedern treten kugelige, etwas hervorragende Höhlungen auf, die mit starker Wandung versehen sind und zahlreiche kleine, Sporen ähnliche, ziemlich kugelige Körper enthalten. Die Wand ist, wie gesagt, stark verdickt und scheint die benachbarten Parenchymzellen flach zusammengedrückt zu haben. In einem Falle, der auch abgebildet ist, beobachte Oliver, daas die sporenähnlichen Körper an den Enden dünner Hyphen sassen, die von der dicken Wandung der Höhlung ausgehen, oder besser gesagt, an der dicken Wandung der Höhlung sitzen. Die sporenähnlichen Körper sind nicht ganz kugelig; ihr längerer Durchmesser ist ungefähr 16 μ. Ihre Wand ist bedecket mit zahldeichen winzigen Erhebungen.

"Mich erinnern diese Bildungen sehr lebhaft an eine Art der Gattung *Urophlyctis*, die auf Umbelliferen auftritt und die ich *Urophlyctis Kriegeriana* genannt habe. . . .

"Aus alledem geht hervor, dass der von F. W. Oliver in den Fiedern von *Alethropteris aquilina* (Schlotheim, Goepp, nachgewiesene Pilz in seinem Aufbau, soweit er von Oliver nachgewissen ist, sehr nahe der Gattung *Urophlyctis* stehen möchte, Oliver hat voller Bescheidenheit unterlassen ihn zu benennen. Ich stehe nicht an, ihn als nahe verwandt der Gattung *Urophlyctis* Schroet. zu bezeichnen und nenne die Gattung *Urophlyctites*, während ich die von F. W. Oliver nachwewiesene und in ihrem Aufbau dargelegte Art als *Urophlyctites Oliverianus* P. Magn. bezeichne."

[Phycomycetae]

ZYGORHYNCHUS Vuillemin n. g. Mucorineae. Bulletin de la Société de France, 19:116. 30 Apr. 1903.

"Filaments du thalle continus, ramifiés, inégaux, parfois noueux, plongeants, rampants ou formant un duvet aérien cotonneux. Chlamydospores lisses, interclaires ou terminales. Pédicelles isolés ou groupés sur des systémes sympodiques irréguliers qui portent des sporocystes normaux, des sporocystes abortifs et des zygospores. Pas d'apophyse. Sporocystes uniformes, à membrane plus ou moins concrescente avec la base de la columelle, plus ou moins incrustée d'oxalate de calcium, plus ou moins diffluente. Quand la membrane est fugace, elle laisse à la base une collerette. Spores nombreuses, petites, lisses. Zygospores forte ment hérissées, rostrées. Tympans d'insertion subopposés, inégaux, le plus petit au sommet du rostre. Suspenseurs inégaux et dissemblables, le petit droit et court, de grand long, courbé, terminé par un renflement piriforme. Gamètes trés inégaux. L'appareil zygosporé naît sur un systéme de filaments aériens, comme les sporocystes.

"2 espèces: *Zygorhynchus heterogamus* (*Mucor heterogamus* Vuillemin. *Bulletin de la Societe botanique de France*, 1886, t. XXIII, p. 236. Figuré: *Bulletin de la Societe des Sciences de Nancy*, 1886, P|. II.)"

"*Zygorhynchus Moelleri* n. sp."

[Ascomycetae]

ALLANTONECTRIA Earle n. g. Hypocreaceae. Plantae Bakerianae, 2:11. 23 March 1901.

"Perithecia as in *Nectria*; ascospores allantoid, 1-celled, cylindric, curved, hyaline.

"Allantonectria Yuccae n. sp. . . . "

[Ascomycetae]

ASTEROPELTIS P. Hennings n. g. Mycrothyriaceae. Hedwigia, 43:380. Sept. 1904.

"Perithecia membranacea dimidiato-scutata, suborbiculata medio pertusa, margine appendiculis rigidis rectis e hyphis con-

flatis vestita; asci fusoidei vel clavati 8-spori, paraphysàti; sporae cylindraceae, pluriseptatae, hyalinae. Micropeltide et Scolecopeltide affin.

"Ein äusserst merkwürdiger Pilz, der durch seine auffrechten, besenartigen schwarzen Borsten, welche aus locker verflochtenen Hyphen bestehen, im feuchten Zustande sternförmig ausgebreitet das Perithecium umgeben, ausgezeichnet ist. Bezüglich der Sporen steht der Pilz zwischen Micropeltis und Scolecopeltis, bei der völligen Reife scheinen die einzelnen Sporengleider zu zerfallen. (Hierzu Textfigur.)"

[Ascomycetae]

BALANSIELLA P. Hennings n. g. Hypocreaceae. Hedwigiia, 43:85. 24 Mar. 1904.

"Stromata stipitato-capitatat, pallida, ceraceo-carnosa e sclerotio plantae virescentiae oriunda. Perithecia stromate immersa sub prominula. Asci cylindracei. Sporae filiformes, septatae.

"B. Orthocladae P. Henn. (= Claviceps pallida [Wint.] var. Orthocladae P. Henn. Hedw. 1900, p. 77.= Balansia diadema A. Möll. Ascom. 1901, p. 197).

"Diese Arten können aber nicht gut zu Balanzia gestellt werden, weil das Stroma letzterer Gattung fast kohlig oder hornartig-hart, aussen schwarz berindet ist. Die Gattung Balansia Speg. gehört demnach besser zu den Dothideaceen neben Ophiodothis und bildet hier eine Parallelgattung mit Balansiella und Cordiceps. Von letzterer Gattung ist Balansiella durch biologische Verhältnisse, so durch das an der lebenden Pflanze bereits die Askenfrüchte entwickelnde blasse, sehr abweichende Skelerotium, ferner durch die Conidienbildungen, die septierten Sporen u. s. w. vershieden. Es erscheint daher zweckmässiger, auf Grund dieser Unterschiede eine neue Gattung aufzustellen, da hierdurch der bestehenden Verwirrung Einhalt geboten werden dürfte."

[Ascomycetae]

CHRYSOGLUTEN Briosi et Farneti *Pionnotes* Fr. ex parte, n. g. Ghrysoglutenaceae. Atti dell' Instituto Botanico dell' Universita di Pavia, 8:117. 1904.

"Thallus udus gelatinosus, siccus crustaceus, nunquam frondosus nec laciniatus, generaliter aurantiacus; peritheciis aurantiis vel luteis; paraphysis nullis."

[Ascomycetae]

CHRYSOGLUTENACEAE Briosi et Farneti n. fam. Lichenes. Atti dell' Instituto Botanico dell' Universita di Pavia, 8:117. 1904.

"Thallus udus gelatinosus siccus crustaceus, nunquam frondosus nec laciniatus, generaliter aurantiacus; excipulum formatur e natura propria vel ab illa thalli diversa; peritheciis cum contextu pseudo-parenchymatico aurantiaco vel luteo. Superficies thalli conidiophora."

[Ascomycetae]

COCCODISCUS P. Hennings n. g. Soccoideaceae. Hedwigia. 43:144. 24 Mar. 1904.

"Stromata subcarnosa, discoideo-rotundata, inferne medio substipitato-affixa, atra. Perithecia immersa, globulosa; asci clavati, 8-spori, paraphysati. Sporae ovoideae, continuae, basi papillatae, fuscae.

C. quercicola, P. Henn. n. sp. . . ."

[Ascomycetae]

DEBARYELLA v. Höhnel n. g. Hypocreaceae. Annales Mycologici, 2:274 5. Mai 1904.

"Es giebt einige Hypocreaceen, deren weisse oder hyaline Perithecien ganz in die leeren Hohlräume der Perithecien alter stromatischer Pyrenomyceten eingesenkt sind. Hierher gehört *Passerinula candida* Sacc., das in *Fenestella vestita* und *Valsaria insitiva* lebt und einen langen cylindrischen, an der Spitze stark gekrümmten, weit vorragenden Hals bestizt und zweizellige braune Sporen hat.

"Ebenso verhält sich *Charonectria biparasitica* v. H., die in *Valsa flavovirens* lebt, keinen Schnabel und zweizellige hyaline Sporen besitzt. Sie unterscheidet sich von *Passerinula* auch durch den völligen Mangel der Paraphysen, und dürfte vielleicht besser in eine eigene Gattung gebracht werden (Mycol. Fragm. in Ann. Myc. 1903, p 395). Eine dritte, in der Lebensweise völlig gleiche, aber durch 4-zellige, ganz hyaline Sporen verschiedene Form, die ich in Ernnerung an meinen unvergesslichen Lehrer Anton de Bary: *Debaryella* nenne, fand ich in *Valsa scabrosa* parasitierend am Dachsbauberg in der Pfalzau (Wiener Wald, Mai 1903).

"*Debaryella hyalina* n. sp. hat hyaline bis sehr blass gelbliche, länglich eiförmige, ca. 200 μ hohe und 140 μ breite, kleinzellig-prosenchymatisch-dünnwandige Perithecien, die in einen 50-60 μ langen und 40 μ breiten, fast parallelfasserig gebauten Hals, der oben weit offen ist, verschmälert sind und, wie es scheint, stets einzeln in den leeren Perithecienhöhlen von *Valsa scabrosa* ganz eingesenkt sind, mit dem Schnabel kaum vorragend. Die Asci sind zahlreich, cylindrisch, oben abgerundet, dünnwandig, kurz gestielt, schief einreirig, 8 sporig, 130-160 x 10-12 μ gross. Paraphysen dünnfädig, bald verschleimend. Sporen hyalin, 4-zellig, mit 4 grossen Oeltropfen, dünnwandig, gerade oder kaum gekrümmt, spindelförmig, an den Enden meist stumpflich, 21-26 x 6-7 μ."

[Ascomycetae]

ENGLERULACEAE P. Hennings n. fam. Ascomycetae. Hedwigia, 43:354. 3 Sept. 1904.

"Die Familie der Englerulaceae ist besonders durch die eigentümliche subanhyste, strukturlose Beschaffenheit des Gehäuses eigentümlich, dadurch von den Perisporiaceae, Hypo-

cretceae u. s. w. verschieden, den Uebergang aber zwischen diesen Gattungen vermittelnd."

[Ascomycetae]

GUILLIERMONDIA Boudier n. g. Myriangiaceae. Bulletin de la Société de France, 20:19. 25 Feb. 1904.

"Recepteculum minutissimum, rotundatum, nitens, 0.25 mm. ad 0.60 mm. latum, fimicolum, è pallidè-ochraceo atrum, membranâ tenui non cellulosâ omnino circumdatum, intus tuberculo basali carnoso crasse hymenifero et gelatinâ spissâ immerso instructum. Paraphyses filiformes, thecas superantes et gelino immixtae. Thecae, numerosissimae, primo piriformes, dein rotundatae, pediculatae octosporae, crasse stipitatae, indehiscentes, sed facile diffluentes, et globulos sporarum liberos relinquentes. Sporae ellipticae, juniores hyalinae, dein fulvae denique maturae brunneo-purpureae, episporio ceraceo irregulariter verruculosae et mutuâ pressione angulosae, semper in globulum rotundatum conglutinatae, sed non sacculo inclusae. Gelatina spissa lutea, thecis avulsis cellulosa apparens."

[Ascomycetae]

HYPOXYLONOPSIS P. Hennings n. g. Dothidiaceae. Hedwigia, 43:256. 12 Juni 1904.

"Hypoxylonopsis P. Henn. n. gen.; stromata crasse pulvinata, tuberculata, sublignoso-coriacea, nigricantia; perithecia immersa ostiolata; asci cylindracei, 8-spori paraphysati; sporae ellipsoideae, 1 septatae, fuscae.

"Plowrightia et Dothidia affin. sed stromata diversa, Hypoxylone simillima."

[Ascomycetae]

KUSANOBOTRYS P. Hennings n. g. Perisporiaceae. Hedwigia, 43:141. 24 Mar. 1904.

"Perithecia in mycelio crustaceo atro, stromatico, superficialia, botryosa, subovoidea, membranacea, atra, basi setulis superantibus circumdatis. Asci ovoidei, 4-8-spori aparaphysati. Sporae ovoideae 1-septatae, fuscae.

"K. Bambusae P. Henn. n. sp. . . .

"Ein höchst merkwürdiger Pilz, den ich vorläufig zu den Perisporiaceen stelle. Die traubig dicht gedrängten Perithecien, meist 5-10, entstehen aus einen oberflächlich mit aufrechten Borsten besetzten schwarzen Strome in rundlichen Flecken. Dieselben scheinen ein undeutliches Ostiolum zu besitzen."

[Ascomycetae]

MAURODOTHIS Sacc. et Syd. n. g. Dothideaceae. Annales Mycologici, 2:166. 15 Apr. 1904.

"Stromata superficialia vel subsuperficialia, minuta, disciformia, atra; loculi immersi. Asci octrospori. Sporidia oblonga, 1-septata, colorata. A *Phaeodothide*; cui sporidiis similis, differt stromate superficiali, disciformi.

"Maurodothis Alyxiae Sacc. et Syd. nov. spec. . . ."

[Ascomycetae]

METADOTHELLA P. Hennings n. g. Pseudophacidiaceae. Hedwigia, 43:384. 3 Sept. 1904.

"Ascomata patelliformia, atra, per rimas stellatas epidermis erumpentia; asci clavati, 8-spori, paraphysati; sporae oblongae, 1-septatae, hyalino-brunneolae. Dothiorae et Metadothide affin. sed sporae 1-septatae, coloratae.

"M. stellata P. Henn. n. sp. . . .

"Ein merkwürdiger Pilz, dessen Ascomata aus sternförmig gestellten erhabenen Rissen hervorbrechen. Nach Rehms freudlicher Mitteilungen gehört derselbe in die Nähe von Dothiora Fr. oder Metadothis Sacc. Da die Sporen nur einseptiert, später gefärbt sind, so muss derselbe in ein neues Genus gestellt werden. (Hierzu Textfigur.)"

[Ascomycetae]

MICROCYCLUS Saccardo n. g. Dothideaceae. Annales Mycologici, 2:165. 15 Apr. 1904.

"Stromata superficialia, minuta, disciformia, atra; loculi immersi. Asci octospori. Sporidia oblonga, 1-septata, hyalina. A *Dothidella* differt stromata superficiali, disciformi, saepius minuto.

"Microcyclus angolensis Sacc. et Syd. nov. spec. . . .

"Unter *Microcylus* Sacc. sind die Arten der Gattung *Dothidella* mit hyalinen Sporen und oberflächlichen, scheibenförmigen Stromata zu vereinigen. Wir betrachten *M. angolensis* Sacc. et Syd. als den Typus der Gattung."

[Ascomycetae]

NEOREHMIA v. Höhnel n. g. Perisporiaceae. Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften, Mathematsch-Naturwissenschaftliche Classe, Wien, 111:988. 1902.

"Peritheciis sessilibus, liberis, globosis, subcarnosis, ex olivaceo nigrescentibus, pilis rigidis ornatis; ostiolo nullo vel obsoleto; paraphysis parcis; ascis clavatis, octosporis; sporidiis hyalinis, e cellulis binis, globosis, facile iamque ipso in asco se separantibus formatis."

"Neorehmia ist eine form, deren sichere Einreihung nicht geringe Schwierigkeiten bietet. Die neue Gattung zeigt verwandschaft zu den Perisporiaceen, Hypocreaceen und Trichosphaeriaceen."

[Ascomycetae]

OPHIODOTHELLA P. Hennings n. subg. [Ophiodothis.] Dothidiaceae. Hedwigia, 43:258. 12 Juni 1904.

"Ophiodothis (Ophiodothella) atromaculans P. Henn. n. sp.

"Ich stelle diese Art, welche äusserlich der O. Balansae Speg. sehr ähnlich, von O. Ulei Rehm u. s. w. verschieden ist, vorläufig in obige Gattung in ein Subgenus Ophiodothella. Die meisten zumal Gräser bewohnenden Arten der Gattung besitzen cylindrische Asken, welche mit einem verdickten, oft kugelig abge-

rundeten, gefurchten Scheitel, wie bei Cordiceps, Balansia, etc., versehen sind. Bei dieser Art sind die Asken fusoid, ohne diese charakteristischen Köpfe. Dieses Merkmal ist anscheinend geringfügig, aber im Vergleich mit den betreffenden Gattungen der Hypocreaceen sowie Balansia, die Gräser bewohnenden Ophiodothis-Arten besonders hervorhebbar. Obiger Pilz bildet auf beiden Seiten der Blätter ausgebreitete schwarze krustige stromatische Überzüge, aus denen die kleinen hemisphärischen, fast kohligen schwarzen Stromata, welche meist nur ein Perithecium enthalten, herdenweise hervorbrechen. Diese Stromata wären vielleicht besser als Perithecien zy bezeichnen."

[Ascomycetae]

OPHIOPELTIS d'Almeida et de Souza da Camara n. g. Microthyriaceae. Revista Agronomica, 1:175. May 1903.

"Perithecia submembranacea, dimidiato-scutata, superficialia, centro perforata; asci subcylindracei, aparaphysati, trispori; sporidia vermicularia, ascos subaequantia, multiguttata, hyalina.

"Ad *Microthyriaceas* accedit ob perithecia dimidiata, tanquam trispora asci videntur.

"Ophiopeltis Oleae n. sp. (Tab. x, fig. 8-10). . . ."

[Ascomycetae]

PARMULARIELLA P. Hennings n. g. Hysteriaceae. Hedwigia, 43:266. 12 Juni 1904.

"Parmulariella P. Henn. n. gen.; stromata superficialia dimidiatoscutellata: perithecia in stromate immersa, radiantia, rima longitudinaliter dehiscentia; asci ovoidei vel clavati, 8-spori; sporae oblonge clavatae, 1-dein 3-septatae, omnino hyalinae. Parmularia affin. simillimaque, sed sporis-hyalinis deinde 3-septatis."

[Ascomycetae]

PERISPORINA P. Henn. n. g. Perisporiaceae. Hedwigia, 43:357. 3 Sept. 1904.

"Mycelium arachnoideo-floccosum, hyalino-fuscum; perithecia subglobosa, membranacea astoma; asci ovoideo-clavati, 8-spori; sporae cylindraceo-clavatae, 2-septatae, fuscae. Meliolae, Perisporio affin.

'P. manaosensis P. Henn. n. sp. . . .

"Ein höchst merkwürdiger Pilz, der mit Meliola gewisse Verwandtschaft hat, aber durch die clavaten Sporen, das eigenartige flockige, farblose, später schwärzliche Mycel nicht dazu gezogen werden kann."

[Ascomycetae]

PERISPORIOPSIS P. Hennings n. g. Perisporiaceae. Hedwigia, 43:83. 24 Mar. 1904.

"Perithecia ovoidea, perforata, membranacea subrata in mycelio fibroso, subcrustaceo maculiformi, fusco. Asci clavati, 8-spori aparaphysati. Sporae oblonge fusoideae 3-7-septatae, subhyalino-

flavescentiae. Perisporio affn. sed sporis subpallidis haud fatiscentiis."

"P. Struthanthi P. Henn. n. sp. . . ."

[Ascomycetae]

PERROTIA Boudier n. g. Pezizales. Bulletin de la Société de France, 17:24. 1901.

"Species minores, sessiles, pilosae primo clausae, dein out jove pluvio aperte. Receptaculum sessile, carnosum, extus pilis septatis, coloratis, granulosis vestitum; hymenio thecis clavatis, octosporis, operculatis, ad apicem obtusis, ad basim attenuatis; paraphysibus filiformibus, septatis, intus parce granulosis, ad apicem vix crassioribus, non acuminatis; sporis achrois, oblongis, hyalinis, rectis aut leniter curvulis, primo continuis,deinque medio uni-septatis."

[Ascomycetae]

PHAEODOTHIS Sydow n. g. Dothideaceae. Annales Mycologici, 2:166. 15 Apr. 1904.

"Stromata innata, effusa, subplana, atra; loculi immersi. Asci octospori. Sporidia oblonga, 1-septata, colorata.—A *Dothidella*, cui proxime accedit, differt sporidiis coloratis, nec hyalinis.

"Phaeodothis Tricuspidis Syd. nov. spec. . . .

"*Phaeodothis Tricuspis* repräsentiert gut den Typus dieser neuen Gattung."

[Ascomycetae]

PHAEOSCUTELLA P. Hennings, n. g. Microthyriaceae. Hedwigia, 43:382. 3 Sept. 1904.

"Perithecia subdimidiato-scutellata; tenue membranacea, subfibrosa, fuscidula pellucida, sine structura cellulosa; asci ellipsoidei vel ovoidei 8-spori aparaphysati; sporae parallelo-conglobatae, cylindraceae, pluriseptatae, fuscae.

"Ph. Gynerii P. Henn. n. sp. . . .

"Ein durch die völlig strukturlose, dünnhäutige Beschaffenheit der Perithecien völlig abweichender Pilz, den ich mit Bedenken zu den Microthyriaceen stelle, aber durch andere Merkmale gehört er am besten hierher. Die dünnhäutigen, fast durchscheinenden, schmutzig bräunlichen Perithecien sind von dunkleren Hyphen durchsetzt, an denen sich häufig fusoide braune, 3-5-septierte Conidien bilden, doch kommen auch eiförmige, 1-septierte Conidien vor. Ob die Hyphen und Conidien dem Pilze angehören, lässt sich nicht sicher feststellen, möglicherweise gehören diese verschiedenartigen anderen Pilzen an. Die Asken liegen oft ziemlich regellos im Perithecium und sind unter dem Mikroskope durchscheinend. (Tafel V. Fig. 6.) (Hierzu Textfigur.)"

[Ascomycetae]

PICHIA E. Chr. Hansen n. g. Saccharomycetae. Centralblatt für Bakteriologie, Parasitenkunde u. Infektionskrankheiten, Zweite Abteilung, 12:538. 19 Aug. 1904.

"Spore halbkugelförmig oder unregelmässig und ackig. Keine Gärung; starke Mycelbildung.

"Pichia membranaefaciens (Syn. Sacch. membranaefaciens E. Chr. Hansen). Ebenfalls einige von Pichi beschriebenen Arten. Zu dieser Gattung gehören wahrscheinlich auch Lindners zwei Arten: Saccharomyces hyalosporus und Sacch. farinosus."

[Ascomycetae]

REHMIOMYCES P. Hennings n. g. Bulgariaceae. Hedwigia, 43:270. 12 Juni 1904.

"Rehmiomyces P. Henn. n. gen. Ascomata erumpente superficialia, subtremellosa sicco cornea, atra, primo subgloboso-clausa, dein cupulata convexo-explanata. Asci clavati, octospori, paraphysati. Sporae ovoideae, primo medio 1-septatae dein pluriseptatae muraliae, hyalinae."

[Ascomycetae]

RHYNCHONECTRIA v. Höhnel n. g. Nectriaceae. Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften, Mathematisch-Naturwissenschaftliche Classe, Wien, 111:1023. 1902.

"Peritheciis superficialibus, carnosis, pallidis vel laete coloratis, elongatis, ostiolo acute termanitis; ascis 4-8-sporis; sporidiis hyalinis, fusiformibus, uniseptatis, utrinque ciliatis.

"Species unica: *Rh. longispora* (Phill. et Ploror.) v. H., Kings Lynn Brittanniae, v. Grevillea XIII, p. 78."

[Ascomycetae]

RICKIELLA Sydow n. g. Cyttariaceae. Annales Mycologici, 2:244. Mai 1904.

'Rickiella Syd. nov. gen. in litt.

"Pileo convexo, carnoso, subcartilagineo, substipitato, turbinato; disco obtuse marginato, hymenifero; inferne canalibus et labyrinthis fenestrato, totam massam subiculi crassi, carnosi interius exteriusque percurrentibus. Asci cylindrici. Sporae ovales, uniloculares. Paraphyses ut in Eupezizeis.

"Est quasi *Clathracea* ascogena. A *Cyttaria* differt disco nunquam poroso et hymenio ad discum restricto. Ab *Acetabula* tota structura clathri distinguitur. *Berggrenia* Cooke videtur similis, sed est incerta, nec ejus descriptio quadrat.

"Das Genus gehört zur Familie der Cyttariaceen und stellt nicht undeutlich den Uebergang von den Eupezizeen zu den Cyttariaceen dar (unde nomen *transiens*). Auch pflanzengeographische Bedeutung kommt dem Funde zu. Die Cyttarieen gehören der antarktischen Zone an und reichen nicht herauf bis nach Brasilien. Klimatische Verhältnisse mögen dazu beitragen haben, *Rickiella* und *Cyttaria* zu zwei gut getrennten Gattungen, die eine als Form der subtropischen, die andere als Typus der antarktischen Zone auszubilden. Wirklich gelatinös ist das Fleisch nicht und das Genus gehört daher nicht zu den Bulgariaceen."

[Ascomycetae]

SACCARDOMYCES P. Hennings n. g. Englerulaceae. Hedwigia, 43:353. 3 Sept. 1904.

"Perithecia superficialia, minutissima, subovoidea, contextu tenui membranacea, subanhysta, hyphis radiatis-composita, pallido-fuscidula, poro paraphysibus tenuissime filiformibus; asci subfusoidei, 8-spori, paraphysati; sporae aciculari-filiformes, hyalinae, continuae. Hyalodermate, Globulinae et Englerulae aff.

"S. socius P. Henn. n. sp. . . ."

"S. bactridicola P. Henn. n. sp. . . .

[Ascomycetae]

SACCHAROMYCODES E. Chr. Hansen n. g. Saccharomycetae. Centralblatt für Bakteriologie, Parasitenkunde u. Infektionskrankheiten, Zweite Abteilung, 12:537. 19 Aug. 1904.

"Durch die Keimung der mit 1 Membran versehenen Sporen entwickelt sich ein Promycelium. Von diesem sowie von den vegetativen Zellen findet eine Sprossung mit unvollständiger Abschnürung statt. Mycelbildung mit deutlichen Querwänden.

"Zwei Arten sind bekannt, nämlich, der im vorhergehenden erwähnte Saccharomycodes Ludwigii (Syn. Saccharomyces Ludwigii E. Chr. Hansen) und eine andere Art, von welcher Behrens in der Wochenschr. f. Brauerei, 1896, p. 850 eine ausführliche und eingehende Beschreibung gibt, doch ohne einen systematischen Namen daran zu knüpfen."

[Ascomyceatae]

SEURATIA Patouillard n. g. Capnodiaceae. Bulletin de la Société Mycologique de France, 20:136. 20 July 1904.

"Biogena. Subiculum nullum. Perithecia sicca rigida, humida gelatinoso-mollia, sessilia, varie ramosa, ex hyphis subhyalinis moniliformibus composita, rima laterali dehiscentia; asci suboctospori; sporidia uniseptata, hyalina.

"S. coffeicola. . . .

"Genre de la famille des Capnodiacés, se séparant des similaires par l'absence de mycélium superficiel, par la consistance gélatineuse et par sa déhiscence toute particulière. A la face supérieure de chaque rameau du périthèce et non à l'extrémité, se forme une crevasse longitudinale, dont les bords se relèvent, laissant une large ouverture hystéroïde béante. La trame du périthèce est composée d'articles sépares, pyriformes ou ovoïdes, gélatineux, incolores dans les parties profondes et brunâtres au voisinage de la surface."

[Ascomycetae.]

SORICA Giesenhagen n. g. Xylariae. Berichte der Deutchen Botanischen Gesellschaft, 22:195. 1904.

"Fruchtkörper aus einem zylindrischen stromaartigen Stiel gebildet, der an der Spitze ein einziges Perithecium mit schnabelartig verlängerten Hals trägt. Gehäuse derb, trocken fast hornartig; Schläuche langstielig keulenförmig, mit acht kugeligen

einzelligen braunen Sporen. Als Nebenfruchtformen treten Pykniden und freie konidienbildende Stielzellen auf. Oberflächlich auf lebenden Pflanzen schmarotzend."

[Ascomycetae.]

STICTOCLYPEOLUM Rehm n. g. Mollisiaceae. Hedwigia, 44:9. 29 Okt. 1904.

"Apothecia in mycelio membranaceo tenuissimo sessilia, primitus lata basi conoidea, poro minutissimo pertusa, dein hemiglobosa, disco urceolato, excipulo crasso, glabro, laterali parenchymatice contexto, hypothecio hyalino. Asci clavati, 8-spori. Sporae fusiformes, medio septatae, hyalinae, distichae. Paraphyses versus apicem ramosae.

"(Die jungen Apothecien machen den Eindruck eines Clypeolum mit winzigem Porus, die entwickelten sehen Stictisähnlich aus. Das Gehäuse zeigt seitlich sich deutlich entwickelt, während es am Grund nur als farbloses Hypothecium zu erkennen ist. Nach seiner endlichen Ausbildung kann der Pilz nur bei den Mollisieen untergebracht werden und steht der Gattung Pazschkea zunächst, unterscheidet sich aber völlig durch seinen Gehäusebau.)"

[Ascomycetae.]

TRICHOPHYMA Rehm n. g. Myriangiales. Hedwigia, 44:7. 29 Okt. 1904.

"Mycelium microthyrioideum e vittis tenellis centrifugis radiatim prosenchymatice contextum, hyalinum, pilis hyalinis septatis longis obsessum. Perithecia sparsa, plerumque solitaria, tubercula minutissima, membrana, tenuissima obtecta. Asci globosi dispersi in strato hyalino, 8-spori. Sporae oblongae, 3-septatae, demum muriformiter divisae, hyalinae.

"(Steht zunächst Leptophyma im Bau des Perithecium.)"

[Ascomycetae.]

ULEOPELTIS P. Hennings n. g. Hysteriaceae. Hedwigia, 43:267. 12 Juni 1904.

"Uleopeltis P. Henn. n. gen.; stromata superficialia, dimidiata-scutellata, subcarbonacea, atra; perithecia in stromate immersa, rima subcirculariter dehiscentia; asci clavati, 8-spori, paraphysati; sporae oblonge fusoideae vel lineares, hyaline, pluriseptatae."

[Ascomyceteae]

UNCINULITES Pampaloni n. g. Erysipheae. Atti della Reale Accademia Dei Lincei, Rome, 299:250-251. 1902.

"*Uncinulites Baccarini* Pampoloni.

"Perithecia subglobosa, tenui membranacea, nigra, astoma, 30-35μ, appendicibus, 18-25 cm. longis, apice uncinatis, perithecium fere aequantibus, indivisis, ad apicem fuscis ad basim atris."

[Ascomycetae.]

WILLIA E. Chr. Hansen n. g. Saccharomycetae. Centralblatt für Bakteriologie, Parasitenkunde u. Infektionskrankheiten, Zweite Abteilung, 12:538. 19 Aug. 1904.

"Spore hut- oder zitronenförmig mit stark hervorspringender Leiste. Die meisten Arten sind kräftige Esterbildner, einige wenige rufen keine Gärung hervor.

"Willia anomala (Syn. Sacch. anomalus E. Chr. Hansen). Willia Saturnus (Syn. Sacch. Saturnus Klöcker). Ebenfalls die von Steuber in der Zeitschr. f. d. ges. Brauwesen, 1900, beschriebenen Arten und Varietäten."

[Ascomycetae.]

YOSHINAGAIA P. Hennings n. g. Coccoideaceae. Hedwigia, 43:143. 24 Mar. 1904.

"Stromata subcarnosa cornea, disciformi-pulvinata erumpenti-superficialia, medio substipitato-affixa, atra. Perithecia immersa, globulosa, subverruciformiostiolata. Asci octospori, paraphysati. Sporae fusoideae, hyalinae, 1-septatae."

"Y. Quercus P. Henn. n. sp. . . . "

[Ascomycetae.]

ZUKALIOPSIS P. Hennings n. g. Perisporiaceae. Hedwigia, 43:367. 3 Sept. 1904.

"Perithecia superficialia, mycelio effuso fusco circumdata, submembranacea, atra, subastoma; asci subovoidei, 8-spori; sporae cylindraceo-oblongae vel clavatae, pluriseptatae, muraliae, hyalinae. Zukaliae affin. sed sporae muraliodivisae.

"Z. amazonica P. Henn. n. sp. . . .

"Die Perithecien treten meist auf der Oberseite der Blätter punktförmig auf, diese oft völlig bedeckend. Die meisten derselben sind leider unreif. Mit Zukalia hat der Pilz grosse Aehnlichkeit, ist aber durch die mauerförmig geteilten Sporen nach dem Saccardo'schen System zu den Hyalodictyae der Perisporiaceen zu stellen."

[Ascomycetae.]

ZYGOSACCHAROMYCES Barker n. g. Saccharomycetae. Centralblatt für Bakteriologie, Parasitienkunde u. Infektionskrankheiten, Zweite Abteilung, 12:537. 19 Aug. 1904. [Proposed as a new genus by Barker in Philosophical Transactions of the Royal Society of London, Ser. B. 194:467-485, 1891, but no species named, hence not there technically described.]

"Zeichnet sich durch eine Kopulation der Zellen aus, stimmt übrigens mit der vorhergehenden Gattung [Saccharomyces] überein.

"Hierher gehört die von Barker beschriebene Art."

[Aecidiomycetae.]

PHAEOTRIPHRAGMIUM Milesi et Traverso n. sect. sub. Triphragmium. Annales Mycologici, 2:145. 15 Apr. 1904.

"Armata. Teleutosporae umbrino-fuligineae."

[Aecidiomycetae.]

XANTHOTRIPHRAGMIUM Milesi et Traverso n. sect. sub Triphragmium. Annales Mycologici, 2:145. 15 Apr. 1904.

"Inermia. Teleutosporae luteo-ferrugineae."

[Basidiomycetae]

ABORTIPORUS Murrill n. g. Polyporaceae. Bulletin of the Torrey Botanical Club, 31:421. Aug. 1904.

"Hymenophore annual, tough, humus-loving; stipe normally central, often obsolete; context yellowish-white, duplex, spongy above, woody below, tubes thin-walled, mouths polygonal; spores subglobose, smooth, hyaline.

"The type of this genus is *Boletus distortus* Schw. (Syn. Fung. Car. 71. 1818), a very variable species found about old stumps in various localities in the Eastern United States. The name assigned to the genus refers to the usual aborted form of the fruit body, in which the tubes with their abundant contents appear prematurely before the development of the pileus is complete."

[Basidiomycetae]

COLTRICIELLA Murrill n. g. Polyporaceae. Bulletin of the Torrey Botnical Club, 31:348. June 1904.

"Hymenophore small, annual, tough, epixylous; stipe attached to the vertex of the pileus; surface of the pileus anoderm, zonate; context spongy, fibrous, ferruginous, tubes angular, one-layered, dissepiments thin; spores ellipsoidal, smooth, ferruginous.

"The type of this genus is *Polyporus dependens* B. & C., a very rare plant found thus far only on dead pine logs in South Carolina and New Jersey. In some ways it resembles the genus *Porodiscus,* the species of both being small and epixylous with vertically attached stipes, but the two genera are very distinct as regards more important characters, such as the structure of the context and spores. From *Coltricia,* its nearest ally, the present genus differs chiefly in being uniformly epixylous and in having a pendant vertically-attached pileus. The name I have chosen refers to its general resemblance to *Coltricia*, this resemblance being best seen in *Coltricia cinnamomea*, which grows very frequently on wood in a state of advanced decay. Only one species is known."

[Basidiomycetae]

CYCLOMYCETELLA Murrill n. g. Polyporaceae. Bulletin of the Torrey Botanical Club, 31:422. Aug. 1904.

"Hymenophore annual, tough, epixylous, sessile, anoderm, zonate; contex thin, fibrous, brown, tubes short, thin-walled, mouths polygonal, becoming concentrically elongated in some species by the splitting of the radial walls; spores ellipsoidal, smooth, ferruginous.

"This genus is based upon *Boletus pavonius* Hook. (Kunth, Syn. Pl. 1:10. 1822), described from Colombia. Its nearest ally is the old-world genus *Cyclomyces*, erected by Fries in 1830 upon *Cyclomyces fuscus*. In this latter genus the tubes are continuous concentric furrows, while in the species of *Cyclomycetella* which come nearest to *Cyclomyces* the concentric appearance of the hymenium is caused by the partial splitting of the radial walls in age; and the formation of furrows is by no means constant."

[Basidiomycetae]

CYCLOPORUS Murrill n. g. Polyporaceae. Bulletin of the Torrey Botanical Club, 31:423. Aug. 1904.

"Hymenophore annual, tough, anoderm, terrestrial, orbicular, centrally stipitate; context soft, spongy, ferruginous; pores at first polygonal, soon becoming continuous concentric furrows, dissepiments thin, lamelloid; spores ovoid, smooth, ferruginous.

"The type of the genus is *Cyclomyces Greenei* Berk. (Lond. Journ. Bot. 4:306, *pl. II.* 1845), a very rare plant found in temperate regions of North America. The genus *Cycloporus* differs widely from *Cyclomyces* in being terrestial and stipitate instead of epixylous and sessile."

[Basidiomycetae]

EICHLERIELLA Bresadola n. g. Tremellaceae. Annales Mycologici, 1:115. 31 Mar. 1903.

"Fungi membranaceo-ceracei vel membranaceo-subgelatinosi, cupulares vel plano-concavi, raro penduli. Hymenium typice superum, discoideum, tantum in formis pendulis inferum, laeve vel subrugulosum. Basidia globoso-ovoidea, cruciatim partita, 2-4-sterigmatica. Sporae hyalinae, cylindraceae, subcurvulae.

"Est *Stereum* vel *Cyphella* frutificatione tremellacea.

"Genus cl. B. Eichler jure meritoque dicatum.

"Eichleriella incarnata Bres. n. sp. (Tab. III, fig. 1)."

[Basidiomycetae]

GLOBOFOMES Murrill n. g. Polyporaceae. Bulletin of the Torrey Botanical Club, 31:424. Aug. 1904.

"Hymenophore large, woody, encrusted, perennial, epixylous, compound; context ferruginious, punky, tubes cylindrical, thick-walled, stratose; spores ovoid, smooth, ferruginous.

"The type of this genus is *Boletus graveolens* Schw. (Syn. Fung. Car. 71. 1818), a rather rare plant first found in Georgia and the Carolinas, but later discovered as far west as Iowa. The genus is readily distinguished among its allies by its compound pileus, which consists of numerous small, closely imbricated pileoli united into a compact rounded mass.

"The genus *Xylopilus* of Karsten (Hattsv. 2:69. 1882), is also described as having a compound pileus, but *Xylopilus crassus* (Fr.) Karst., its type species, is very probably only an abnor-

mal form of a European species of *Elfvingia;* and even if this type plant were found to be normal the genus *Globifomes* would remain sufficiently distinct."

[Basidiomycetae]

Klastopsora Dietel n. g. Melampsoraceae. Annales Mycologici, 2:26. Jan. 1904.

"Sori teleutosporiferi primum plani ceracei (ut in genere Coleosporio), maturati hemisphaerici, pulverulenti, epidermide diu tecti, denique ea fissa cincti. Teleutosporae catenulatae, simplices. Catenae sporarum immaturarum conglutinatae, maturarum facile disjunctae, fragiles."

[Basidiomycetae]

Kordyanella v. Höhnel n. g. Hymenomycetae. Annales Mycologici, 2:273-4. Mai 1904.

"Der Pilz, *Kordyanella austriaca* n. g. et. sp., bildet 30-60 μ breite, halbkugelige oder flachwarzenförmige Körperchen, die oberflächlich hyalin sind, innen jedoch sehr blass bräunlich gefärbt erscheinen. Auf einem rundlichen, fast halfkugelichen, aus bräunlichen Zellen von 2-2½ μ Diameter, die in wenigen Lagen stehen, bestehenden Gewebskörper sitzen dicht radial angeordnet farblose, mit meist 2-3 (selten 4) Sterigmen versehene Basidien. Diese sind 8-13 μ lang und ca. 2 μ breit, unten sehr schwach erweitert und unterhalb der Sterigmen wenig verschmälert, wodurch sie eine eigentümliche, fast gestreckt flaschenförmige Gestalt annehmen. Die Sterigmen sind sehr dünn, scharf spitzig, steif, wenig divergierend abstehend, seltener schwach gegeneinander gebogen. Die reichlich entwickelten Sporen sind hyalin, länglich bis kurz stäbchenförmig, 2½-4 x 1 μ. Vegetative Hyphen auf der Holzoberfläche, die sicher zu dem Pilze gehörten, konnte ich nicht finden.

"Der Pilz ist offenbar mit *Kordyana* nahe verwandt. Er unterscheidet sich nicht bloss durch seine saprophytische Lebensweise, sondern auch durch Abweichungen im Baue von den beiden *Kordyana*-Arten Raciborski's, welche auf Blättern schmarotzen. *Kordyana Tradescantiae* (Pat.) Rac. hat zwischen den Basidien sterile Hyphen, und *K. Pinangae* Rac. ein nur aus Zeugiten bestehendes Hymenium, aus welchen Zeugiten ohne Abtrennung durch eine Querwand die 2 Sterigmen tragenden Basidien getrieben werden. Es stellen diese 2 Arten offenbar 2 verschiedene Genera dar, von welchen *Kordyanella* verschieden ist."

[Basidiomycetae]

Laetiporus Murrill n. g. Polyporaceae. Bull Torr. Bot. Club, 31:607. Nov. 1904.

"Hymenophore annual, epixylous, fleshy, anoderm, caespitosemultiplex; context cheesy to fragile, light-colored, tubes thin-walled, fragile, bright yellow, mouths irregularly polygonal; spores smooth, hyaline.

"This genus is based on *Agaricus speciosus* Batarr. Fung. Hist. 68, *pl. 34. f. B.* 1755, commonly known as *Polyporus sulphureus* Fr. It may be at once distinguished from species of *Grifola* by its yellow color and arboreal habit. The generic name chosen refers to the brilliantly colored hymenium."

[Basidiomycetae]

LENTODIOPSIS Fr. Bubàk n. g. Agaricaceae. Hedwigia, 43:196. 16 Mai 1904.

"Lentodiopsis n. g. Fruchtkörper zähfleischig, fast lederartig, dauerhaft, eintrocknend. Hut in den Stiel übergehend, zentral gestielt. Lamellen schmal, zähe, weit herablaufend, unten zellenförmige Anastomosen bildend. Schleier ringförmig am Stiele sich ablösend oder strahlenförmig aufreissend. Sporen zylindrisch, hyalin.

"Lentodiopsis albida n. sp. . . ."

[Basidiomycetae]

MYCELIOSTROMA P. Hennings n. subg. [Geaster.] Lycoperdaceae. Hedwigia, 43:185. 16 Mai 1904.

"G. (Myceliostroma) jurensis P. Henn. n. sp.

"Die Art ist mit G. stipitatus Solms, sowie mit G. mirabilis Mont. verwandt, von beiden Arten völlig verschieden. Die mehr oder weniger gestielten, im geschlossenen Zustande an Lycoperdon piriforme erinnernden Fruchtkörper gehen aus einem den Erdboden überziehenden, weit ausgebreiteten, lederig-häutigen Mycel hervor, sie entstehen nebst erstgenannten Arten nicht unterirdisch, wie die übrigen Geaster. Auf Grund dieser Eigentümlichkeit ist eine besondere Untergattung, die ich als "Myceliostroma" bezeichne, da das Mycel stromaähnlich ist, aufzustellen. Von G. stipitatus Solms ist die Art besonders auch durch die um die Hälfte kleineren Sporen völlig verschieden."

[Basidiomycetae]

NIGROFOMES Murrill n. g. Polyporaceae. Bulletin of the Torrey Botanical Club, 31:425. Aug. 1904.

"Hymenophore large, perennial, epixylous, sessile; context woody, purple, tubes cylindrical, stratose, thick-walled, black; spores ovoid, smooth, hyaline.

"The type of this genus is *Polyporus melanoporus* Mont. (Pl. Cell. Cuba, 422. 1842), found on trunks of trees in tropical America. The genus is readily distinguished from its near allies by its purple context and black tubes."

[Basidiomycetae]

PHYLLOPORIA Murrill n. g. Polyporaceae. Torreya, 4:141. Sept. 1904.

"Hymenophore small, tough, annual, attached by the vertex to the lower surface of living leaves; context brown, fibrous, tubes thin-walled, mouths polygonal; spores globose, smooth, pale ferruginous.

"The distinguishing feature of this genus is its habit of growing upon living leaves. It is based upon the following species:

"Phylloporia parasitica sp. nov." . . .

[Basidiomycetae]

POGONOMYCES Murrill n. g. Polyporaceae. Bull. Torr. Bot. Club, 31:609. Nov. 1904.

"Hymenophore annual, epixylous, dimidiate-sessile to flabelliform, thickly covered with rigid hairs; context dark-brown, punky, tubes short, thick-walled, mouths small, circular; spores smooth, hyaline.

"This genus is founded upon *Boletus hydnoides* Sw. (Prodr. 149. 1788), described from Jamaica. It may at once be distinguished from *Trichaptum* by its small, cylindrical, very thick-walled tubes. The name selected refers to its thick covering of bristly hairs."

[Basidiomycetae]

PORONIDULUS Murrill n. g. Polyporaceae. Bulletin of the Torrey Botanical Club, 31:425. Aug. 1904.

"Hymenophore annual, tough, sessile, epixylous, at first sterile and cup-like, the fertile portion developing from the sterile; context white, fibrous, tubes short, thin-walled, mouths polygonal; spores ellipsoidal, smooth, hyaline.

"The type of this genus is *Boletus conchifer* Schw. (Syn. Fung. Car. 1818), a very common and abundant species on dead elm branches. The development of the fruit-body is peculiar, being in two stages, the first ending with the formation of a cup-shaped sterile body, from which the fruit-body proper later develops. This preliminary pileus begins as a knot of whitish mycelium, which soon ceases to grow at the center, while the hyaline borders continue to grow upward and form a cup resembling species of *Nidularia*. The margin of the cup is thin and entire or undulate and becomes darker like the center when the limit of growth is reached, while the concentric zones within very plainly show the progress of the development. The cup varies from deeply infundibuliform to shallow or even flat at times and the central portion which has ceased to grow is much cracked radially to accommodate itself to the growing exterior.

"The pileus proper usually arises from one side of the cup near its base and expands laterally into reniform, zonate hymenophore considerably larger than the sterile portion. At times the pileus does not develop beyond the surface of the cup and at other times a developed pileus becomes proliferous at several points and give rise to new streile and sterile portions. Since the formation of the cups continues throughout the growing season, many are overtaken by winter and are found among the new ones the following spring. The old pilei rarely remain over winter, being fragile and readily devoured by insect larvae."

[Basidiomycetae]

PSEUDOHYDNUM Rick n. g. Hymenomycetae. Ann. Mycolog. 2:409. Sept. 1904.

"Pseudohydnum guepinioides Rick nov. gen. nov. spec.

"Omnia se habent sicut in Hydno, exceptis contextu, qui est gelatinosus et dentibus, qui sunt egregie separabiles et detersiles a trama.

"Die Diagnose der Art ist: . . .

"*Gloeoporus, Paxillus, Boletus* und *Pseudohydnum* bilden eine Reihe von Gattungen, die sich hauptsächlich durch leichte Trennbarkeit der Hymeniumschicht von *Polyporus, Agaricus* und *Hydnum* unterscheiden. Die Berechtigung von *Pseudohydnum* ist nicht grösser und nicht geringer, als die von *Gloeoporus.* Die Stacheln von *Pseudohydnum* sind so leicht angeheftet, dass es genügt, mit dem Finger leise über die Fruchtschicht zu fahren, um sie sofort alle nicht abzubrechen (was bei Hydnum oft auch der Fall ist), sondern abzuheben. Ich hatte die Art in Alkohol gelegt. Auf dem Heimtritt von der Exkursion waren bereits alle Stacheln abgewachsen. Mit regem Interresse studierte ich die Fruchtschicht, da ich glaubte, ein *Tremellodon* vor mir zu haben, allein die Basidien sind nicht die eines Protobasidiomyctetn."

[Basidiomycetae]

PYROPOLYPORUS Murrill n. n. Bulletin of the Torrey Botanical Club, 30:109. 28 Feb. 1903.

"The genus Pyropolyporus.

"The European species of this genus were first separated into a distinct generic group by Quélet in his "Enchiridion Fungorum" published in 1886. His genus Phellinus established at that time contained four species, *P. ignarius* (L.), *P. fulvus* (Scop.), *P. conchatus* (Pers.), and *P. salicinus* (Pers.), and was characterized as follows: "Pileus velvety, persisting; context corky; pores small, fulvus brown; spores ovoid, fulvous. Plants lignatile." The name *Phellinus,* however, is preoccupied by *Phelline* assigned in 1826 to a genus of the Ebenaceae. The new name *Pyropolyporus* here proposed refers to the use of some species of this group in ancient times for the purpose of keeping fire."

[Basidiomycetae]

ROMELLIA Murrill n. g. Polyporaceae. Bulletin of the Torrey Botanical Club, 31-338. June 1904.

"Hymenophore large, irregular, annual, spongy to corky, epixylous; stipe simple, variously attached, surface of pileus anoderm hispid; context ferruginous, tubes irregular, thin-walled, spores ellipsoidal, smooth, hyaline, cystidia none.

"The type of this genus is *Boletus sistotremoides* Alb. & Schw., better known as *Polyporus Schweinitzii* Fr. The plant is a large and striking one, quite common in Europe and

America, and has figured under several genera since it was first described as a *Boletus*. Soon after being transferred to *Polyporus*, it was assigned to *Daedalea* because of its irregular pores. then to *Polystictus* because it seemed nearly allied to *P. perennis*. Quélet, however, overlooked this relationship and classified it under *Cladomeris* with *Polyporus frondosus, P. imberbis*, etc., largely on account of its hyaline spores. The species may be easily confused in some of its forms with *Polyporus hispidus*, but its normal form is stipitate, while *P. hispidus* is always dimidiate and the spores of the former are hyaline while those of the latter are of a deep golden hue. From the genus *Coltricia*, apparently its nearest ally, it differs in having hyaline spores, a more spongy context, differently colored tubes and a very variable stipe."

[Basidiomycetae]

TRICHAPTUM Murrill n. g. Polyporaceae. Bull. Torr. Bot. Club, 31:608. Nov. 1904.

"Hymenophore annual, epixylous, sessile, dimidiate; context brown, firm and leathery below, very loosely fibrous and darker above; tubes short, thin-walled, mouths polygonal, becoming labyrinthiform; spores smooth, hyaline.

"The type of this genus is *Polyporus trichomallus* Berk. & Mont. (Ann. Sci. Nat. III. II:238. 1849), described from Guiana. It resembles the old-world genus *Funalia* erected by Patouillard in 1900 with *P. monsveneris* Jungh., *P. leoninus* Kl. and *P. funalis* Fr. as typical species and *P. trichomallus* Berk. & Mont. in a subsection; but it may be easily distinguished from *Funalia* by its darker context and daedaleoid hymenium. While splitting often occurs, rendering the hymenium irpiciform, the splitting is not so radical as in *Funalia*. The name chosen refers to the loosely woven context."

[Deuteromycetes]

AMPHICHAETA McAlpine n. g. Melanconiales. Proceedings of the Linnean Society of New South Wales, 29:118. 1904.

"Acervuli beneath the epidermis, often erumpent, disc.- or cushion-shaped, black. Sporules elongated, with two or more transverse septa, at least partilally coloured, and with one seta at each end; basidia hyaline filiform."

[Deuteromycetes]

AMPULLARIA Annie Lorrain Smith n. g. Nectrioidaceae. Journal of Botany, 41:258. Aug. 1903.

"Perithecia growing singly, bright-coloured, globose with a long ostiole, formed of delicate cells; spores ovate, dark-coloured when mature.

"A. aurea, sp. unica. . . .

"The fungus corresponds with *Sphaeronemella* among the hyalinespored *Nectrioidaceae*. The only genus under *Nectrioidaceae-Zythieae-Phaesospora,* following Lindau's arrangement,

is *Martinella*, which forms a stroma. *Ampullaria*, with its simple perithecium stands so far by itself. It is probably the pycnidial form of one of the *Hypocreaceae*. The name was suggested by its resemblance to a flask."

[Deuteromycetes]

ATRACTINA v. Höhnel n. g. Hyphomyc. dematicae phragmosp. Hedwigia, 43:298. 12 Juni 1904.

"Sterile Hyphen bräunlich sehr zart, im Substrate kriechend. Fertile Hyphen dunkel gefärbt, einfach, an der Spitze mit einigen parallel angewachsenen kurzen Seitenzweigen penicilliumartig verzweigt. Zweige 1-2 mal geteilt, an der Spitze einzelstehende, längliche, quer geteilte Sporen, die durch Schleim zu einem Köpfchen verbunden sind, tragend. Saprophyt."

[Deuteromycetes]

BACTRIDIOPSIS P. Hennings n. g. Tuberculariaceae. Hedwigia, 43:397. 3 Sept. 1904.

"Sporodochia superficialia pulvinata, subceracea; condia ellipsoidea vel ovoidea, continua, acrogena, magna; conidiophora hyalina teretia. Batridio aff. sed condia continua.

"B. Ulei P. Henn. n. sp. . . .

"Der Pilz hat mit Batridium flavum K et Sch. öusserlich überraschende Aehnlichkeit, ebenso durch die sehr grossen Conidien, welche aber niemals geteilt sind. (Hierzu Textfigur.)"

[Deuteromycetes]

CERCOSPORITES Salmon n. g. Hyphomycetae. Journal of Botany, 41:127. Apr. 1903. [Fossil fungus.]

"Cercosporites sp. Hyphae myceliares filamentosae singulatim repentes dilute brunneae septatae 5-8μ diam. hinc inde in cellulas magnas 15-23μ diam. maturitate opacas atro-brunneas plus minus globosas 3-6-catenulatas vel raro biseriatim aggregatas probabiliter pro sclerotiis habendas subito inflatae."

[Deuteromycetae]

CICINNOBELLA P. Hennings n. g. Sphaeropsidaceae. Hedwigia, 43:386. 3 Sept. 1904.

"Perithecia superficialia, ovoidea membranacea, pallido-fuscidula, apice pertusa in hyphis Parodiellae parasitica; conidia subovoidea, flavido-fuscidula, subcirrhose expulsa.

"C. parodiellicola P. Henn. n. sp. . . .

"Der Pilz ist von Cincinnobolus Ehrenb. hervorragend durch die genfärbten Conidien sowie durch eigenes Mycel unterschieden. (Hierzu Textfigur.)"

[Deuteromycetae]

COLLETOTRICHOPSIS Fr. Bubák n. g. Melanconiaceae. Oesterreichische Botanische Zeitschrift, 54:184. Mai 1904.

"Durch die Lage der Borsten, die hier als eine Pyknidenwand fungieren, weicht der vorliegende Pilz von der Gattung *Colleto-*

trichum weit ab und es wäre wohl angemessener, für denselben eine neue Gattung Colletotrichopsis aufzustellen. Es müsste denn der brasilianische Pilz *Colletotrichopsis Pyri* (Noack) Bubák, der aus Tirol stammende *C. Pyri* (Noack) Bubak forma *tirolensis* Bubak genannt werden.

"Die Gattungsdiagnose ist dann folgende: *Colletotrichopsis* Bubák n. g. Fruchtlager linsenförmig, eingesenkt, von einer Reihe angedrückter, strahlenförmig vom Rande zur Mitte verlaufender Borsten bedeckt. Sporen einzellig, hyalin bis schwach rosenrot auf deutlich entwickelten Trägern stehend."

[Deuteromycetae]

CONIOSCYPHA v. Höhnel n. g. Dematieae. Annales Mycologici, 2:58. Jan. 1904.

"Hyphis subtilibus, hyalinis vel subhyalinis, ramosis, matrici arcte adnatis, vesiculas hyalinas, breve stipitatas gerentibus; vesiculis conidia solitaria, continua, fuliginea demumque ex earum apice exsilientia includentibus."

[Deuteromycetae]

CORYMBOMYCES Appel and Strunk n. g. Mucedinaceae. Centrl. Bak. Parasit. Infektionskr. 2 Abt. 11:633. Mar. 1904.

"Hyphen kriechend; Konidienträger aufrecht, trugdoldenartig verzweigt; Konidien hyalin, ellipsoidisch, am Ende der Träger in Köpfchen stehend, verklebt.

"C. albus n. sp. . . .

"Im System gehört unser Pilz zu den Hyphomycetes-Mucedinaceae-Hyalsporae-Verticillieae."

[Deuteromycetae]

DIPLODIOPSIS P. Hennings n. g. Sphaeropsidaceae. Hedwigia, 43:386. 3 Sept. 1904.

"Stromata superficialia, basi affixa, subcarbonacea, globosa; perithecia immersa; conidia oblonga, 1-septata atrofusca. Chaetodiplodiae et Botryodiplodiae affin. sed superficilia, haud setulosa.

"D. tarapotensis P. Henn. n. sp. . . .

"Die fast kugeligen, granuliert runzeligen, in der Mitte oft etwas genabelten oder niedergedrückten Stromata sind auf der Unterseite dem Blatte sehr leicht angeheftet und fallen bei Berührung leicht ab. Die Entstehung der Conidien konnte infolge der brüchig-kohligen Beschaffenheit der Stromata, welche mehrere Perithecien zu enthalten scheinen, nicht deutlich wahrgenommen werden. Viele Stromata sind völlig unreif. Höchst wahrscheinlich stellt der Pilz das Conidienstadium einer Dothideacee dar. Zu Chaetoplodia kann er wegen der fehlenden Borsten, zu Botryodiplodia etc. wegen des oberflächlichen Vorkommens nicht gezogen werden. (Hierzu Textfigur.)"

[Deuteromycetae]

DIPLOZYTHIA Bubak n. g. Sphaeropsideae. Ann. Mycolog. 2:399. Sept. 1904.

"Fruchtkörper fleischig, fast wachsartig, blutrot gefärbt, einzeln oder auf einem gemeinschaftlichen Subiculum, anfangs kugelig, später eingefallen und ziemlich weit geöffnet. Sporenträger strauchartig verästelt. Sporen zuletzt zweizellig, gebogen.

"Diplozythia scolecospora Bubak n. sp. . . .

"*Diplozythia scolecospora* m. ist vielleicht die Pycnidienform von *Ophionestria scolecospora* Bref. et Tav."

[Deuteromycetae]

EIDAMIA Lindau n. g. Aspergilleae, Hyphomycetes. Rabenhorst's Kryptogamen-Flora, 1^8:123. 30 Juni 1904.

"Syn. Papulaspora Eidam (non Preuss) in Cohns Beitr. III, 414 (1883).

'Hyphen verzweigt, septiert, weiss. Konidienträger aufrecht, verzweigt, septiert, nach der Spitze verjüngt und dann zu einer kugligen Endblase aufgetrieben. Sterigmen auf der Blase radiär stehend, spitz. Konidien in Ketten, hyalin. Ausserdem noch Bulbillen an Seitenzweigen entstehend und an ähnlichen Trägern, wie die Konidien, einzellige Chlamydosporen von eirunder Gestalt und gelbrauner Farbe."

[Deuteromycetae]

EXOSPORINA Oudemans n. g. Tuberculariaceae. Koninklijke Akademie van Wetenschappen te Amsterdam. 1904, p. 501. (25 Feb. 1904.)

"Fungi expositii vel endogeni, stromate nullo vel parum evoluto, conidiis in catenas stipatas digestis, singulatim secedentibus, homomorphis, continuis, coloratis."

[Deuteromycetae]

GIULIA Fl. Tassi n. g. Leptostromaceae [printed as Nematospora Fl. Tassi but changed to *Giulia* on account of Nematospora Peglion.] Bullettino del Laboratorio ed Orto Botanico della R. Universita di Siena, 6:92. 1904.

"Perithecia primitus velata, dein superficialia, elongata, subcarbonacea, atra, astoma, dimidiata; sporulae bacillares, continuae, hyalinae, apice setoloso-penicillatae."

[Deuteromycetae]

GLOIOSPHAERA v. Höhnel n. g. Mucedineae. Sitzungsberichte der Kaiserlichen Akademie der Wissenschaften, Mathematisch-Naturwissenschaftliche Classe, Wien, 111:998. 1902.

"Fungus saprophyticus, totus candidus; hyphis sterilibus parcis, repentibus, matrici adnatis; hyphis fertilibus sparsis, validis, erectis, septatis, asperulatis, apice acutis, inferne simplicibus, superne crebrius septatis denseque verticillatim ramosis, ramulis subtilibus, brevibus, strictis, furcatis, versus sporophori verticem brevioribus et simplicioribus, apice sterigmata complura, acuta gerentibus; conidiis e sterigmatim apice orentibus, non catenulatis, continuis, ellipsoideis, unacum capituli ramulis globulum mucosum, subconsistentem formantibus."

[Deuteromycetae]

HOLCOMYCES Lindau n. g. Leptostromataceae. Verhandlungen des Botanischen Vereins der Provinz Brandenburg, 1903, 45:155. Ausgegeben 20 Februar 1904.

"Fruchtkörper länglich, im Holz entstehend und dann zur Oberfläche hervorbrechend, mit Längsspalt unregelmässig sich öffnend, schwarz. Sterigmen einfach. Sporen ellipsoidisch, zweizellig, braunschwarz, Teilzellen gleich gross.

"Gehört zu den *Leptostromataceae,* Abteilung *Phaeodidymae* und unterscheidet sich von *Diplopeltis* scharf durch die Form der Fruchtkörper.

"H. exiguus Lindau nov. spec." . . .

[Deuteromycetae]

KABATIA Bubák n. g. Leptostromaceae. Oesterreichische Botanische Zeitschrift, 54:28. Jan. 1904.

"Pycniden halbiert, schildförmig, häutig, schwarz, mündungslos, unregelmässig aufreissend, von strahligem, dunkelbraunem Gewebe.

"Sporen stark sichelförmig gekrümmt, hyalin, zweizellig, ungleichseitig."

[Deuteromycetae]

MANGINIA Viala et Pacottet Sphaeropsideae. Comptes Rendus des Seances de l'Academie des Sciences, 139:88. 4 July 1904.

"Le parasite de l'Anthracnose *Sphaceloma ampelinum* de Bary n est connu que par la forme conidienne à basides, en stroma serré à la surface des rameaux ou des raisins verts, portant des conidies en bâtonnets, ovoïdes-cylindiques, avec deux points réfringents, de 3μ à 6μ longuer. Nous avons obtenu, dans nos cultures, cette forme conidienne à spores en bâtonnets, des spermogonies (avec spermaties identiques à ces conidies ou bâtonnets), des pycnides, des sclérotes qui donnent naissance à une autre forme conidienne à grosses spores, un mycélium très polymorphe qui sur les milieux sucrés, se fragmente et produit une forme levure. Toutes ces formes de fructification, par des cultures croisées sur milieux divers, se ramènent les unes aux autres; ensenencées sur les raisins verts, elles reproduisent les lésions et les chancres caractéristiques de la maladie. Ces organes si variés de reproduction séparent le parasite de l'Anthracnose des Mélanconiées et le rattachent au groupe des Sphaeropsidées; nous le nommons *Manginia ampelina* en créant un nouveau genre dans lequel viendront sans doute se ranger les parasites causes des Authracnoses des autres plantes, quand on les aura isolés et cultivés.

"Sur jus de feuilles gélóse, le développement est très rapide; le viole mycélien s'irradie autour du point primitif du semis et couvre en 5 ou 6 jours, sur une êpaisseur de 1mm. à 3 mm., les boîtes de culture de 9 cm. de large et 25 cm. de long. . . .

"Quand on transporte le *M. ampelina,* par semis des précédentes cultures, sur haricot ou lait gèlosé non acide, 2 ou 3 jours aprés, à 25°, les tubes ou les plaques sont criblés de très petits points d'un roux clair. Ce sont des conceptacles simples (diamètre: 112μ) ou composés et alors mamelonnés, portant une ou plusiers ostioles (jusqu'a 12 et 15) circulaires et sessiles, et entourés d'une membrane pluricellulaire; ils renferment une grande quantité de petites spores en bâtonnets identiques aux conidies, et légèrement gris rosé vues en masse et de mêmes dimensions (3μ à 6μ); elles sont produites par des fines basides qui tapissent la paroi des conceptacles; elles germent de la même facon en ce renflant d'abord en leur centre et en poussant un ou deux tubes mycéliens. Nous considérons ces organes, les plus fréquents, comme des spermogonies avec spermaties. . . .

"Dans les milieux liquides, quand les cultures cont âgées, il se forme, dans l'épaisseur de la trame mycélienne boursouflée, des parties plus condensées. Ces nodosités sont de deux sortes: les unes sont des pycnides simples (350μ sur 325μ) à membrane épaisse et foncée en brun, à petites ostioles sessiles produisant, sur une couche serrée de basides qui tapissent les parois externes, des stylospores subovoïdes (longueur 5μ sur 30, diamètre au centre 3μ, 50) incolores, à membranes assez épaisses.

"D'autres nodosités des parties les plus anciennes de la plaque mycélienne, sont plus allongées (3μ, 50), plus étroites (98μ); ce sont des sclérotes rhizomorphiques, à fins tubes mycéliens agglomérés, incolores au centre, plus épais et bruns a la surface. De ces sclérotes pousant, à un moment, des branches simples cloisonnées hyalines; de leur sommet renflé se sépare bientôt une spore presque ronde ou à peine subovoide (8μ sur 7μ), incolore, à protoplasma finement granuleux. C'est une deuxième forme de conidiophores différente de celle qui produit les conidies en bâtonnets.

"Quand les milieux de culture liquides ou même solides sont riches enmatières sucrées, le mycélium, très variquez, provenant de l'un quelconque des organes de reproduction précédents, se fragmente en nombreuses cellules et donne une *forme levure* (7 μ, 50 et 6 μ, sur 4 μ, 50 et 4 u) qui se multiplie par bourgeonnement et produit de l'alcool; une ou plusieurs cellules filles proviennent de la cellule mère, qui est ovoïde, incolore, à protoplasma grumeux et à membrane très distincte. Vues en masse, sur plaques gélosées, par example, les cellules levures ont une coloration d'un gris brun sale, et forment des traînées épaisses et fluides. Transportées sur haricot gélosé sans sucre, dès parfois la première culture ou après plusieurs passages, ces formes levures redonnent des conceptacles spermogonies. Les formes levures des cultures anciennes et en milieux très sucrés forment deux (ou une) spores internes, à membrane propre dans la membrane commune de la cellule mère."

[Deuteromycetae]

NEMATOSPORA Fl. Tassi n. g. Leptosthomaceae, changed to *Giulia* on account of Nematospora Peglion. Cf. *Giulia.* Bullettino del Laboratorio ed Orto Botanico della R. Università di Siena, 6:92. 1904.

[Deuteromycetae]

ONCOPODIUM Sacc. n. g. Annales Mycologici, 2:19. Jan. 1904.

"Hyphae steriles brevissimae, h. e stratum proliferum tenuissimum formantes et basidia conidiophora immediate gignentes. Basidia laxe fasciculata, continua, filiforma, sub conidio conspicue vesiculoso-tumentia, hyalina, apice monospora. Conidia subglobosa, pluriseptato-clathrata, fuliginea, utrinque lateraliter (nec apice) in apiculum conicum subhyalinum producta. Ob basidia apice vesiculosa *Stemphylium in atum* in memoriam revocat, sed basidiis simplicibus, conidiis lateraliter apiculatis omnino differt. In systemate prope *Sporodesmium* locandum genus."

[Deuteromycetae]

PELTISTROMA P. Hennings n. g. Leptostromataceae. Hedwigia, 43:391. 3 Sept. 1904.

"Stromata superficialia rotundato-effusa, atro-membranacea, radiato-cellulosa; perithecia hemisphaerico-elevata, poro pertusa; conidia oblonga, continua, flavido-fusca.

"P. juruana P. Henn. n. sp. . . . .

"Jedenfalls Conidienstadium einer Microthyriacee, die schwarzen krustenförmigen Stromata, aus denen sich die Perithecien papillenartig hervorheben, überziehen meist die ganze Blattseite. Vielleicht zu Asterina reptans B. et C. gehörig. (Hierzu Textfigur.)"

[Deuteromycetae]

PHRAGMOPELTIS P. Hennings n. g. Leptostromataceae. Hedwigia, 43:392. 3 Sept. 1904.

"Stromata superficialia, membranacea, dimidiato-scutata, radiato-cellulosa, rugulosa, poro pertusa, atra; conidia oblonga, diutius hyalina continua, deinde 3-septata, atra.

"Ph. Siparunae P. Henn. n. sp.

"Ein höchst merkwürdiger Pilz, welcher zweifellos das Conidienstadium einer Microthyriacee darstellt. Die Conidien sind sehr lange völlig hyalin, ungeteilt, später gelbbräunlich, zuletzt braun-schwartz, 1- dann 3-septiert, an kurzen, farblosen Trägern entstehend. (Hierzu Textfigur.)"

[Deuteromycetae]

POROPELTIS P. Hennings n. g. Leptostromataceae. Hedwigia, 43:390. 3 Sept. 1904.

"Stromata superficialia pulvinata, vel dimidiato-scutata, carbonacea subradiata, sulcata, loculis plurimis immersis deinde po-

roso vel subrimoso apertis; conidia subellipsoidea, fusca, continua.

"P. Davillae P. Henn. n. sp. . . .

"Dieses Conidienstadium gehört zweifellos einer Hysteriacee, aus der Verwandtschaft von Parmularia an. Die Stromata sind teilweise recht verschieden ausgebildet, dieselben zerfallen bei der Reife von oben und treten alsdann zerstreut stehende offene, meist rundliche Fächer hervor. Dieselben werden von einem Parasiten (Paranectriella spec.), der leider schlecht entwickelt ist, bewohnt, ausserdem tritt eine Aschersonia u. s. w. auf gleichem Blättern auf. (Hierzu Textfigur.)"

[Deuteromycetae]

PYCNOSTYSANUS Lindau n. g. Hyphomycetae. Verhandlungen des Botanischen Vereins der Provinz Brandenburg, 1903, 45:160. Ausgegeben 20 Feb. 1904.

"Coremien einfach, starr, aus längverlaufenden Fäden gebildet. Köpfchen klein, fest. Sporen in Ketten gebildet, ungeteilt, ellipsoidisch, dunkel gefärbt."

[Deuteromycetae]

SEPTODOTHIDEOPSIS P. Hennings n. g. Sphaeropsidaceae. Hedwigia, 43:387. 3 Sept. 1904.

"Stromata superficialia, carbonacea, pulvinata, atra, rugosa, setulosa, peritheciis immersis; conidiis filiformibus falcatis, hyalinis, pluriguttulatis vel obsolete septatis. Cytosporinae Sacc., Septoriellae Oud. aff., sed stromatibus superficialibus.

"S. manaosensis P. Henn, n. sp. . . . .

"Die schwarzen Stromata treten herdenweise besonders auf der Blattunterseite auf, die meisten sind völlig unreif, nur in wenig im Innern blassen Perithecien wurden Conidien beobachtet, doch konnte wegen der kohligbrüchigen Beschaffenheit des Stromas die Entstehung derselben nicht festgestellt werden. Jedenfalls stellt die Art eine Conidienform einer Dothideacee dar. (Hierzu Textfigur.)"

[Deuteromycetae]

SEYNESIOPSIS P. Hennings n. g. Leptostromataceae. Hedwigia, 43:392. 3 Sept. 1904.

"Stromata innato-superficialia, submembranaceo-crustacea atra, rotundato-discoidea; perithecia immersa, ostilota pertusa; conidia ovoidea 1-septata, atra.

"S. rionegrensis P. Henn. n. sp. . . . .

"Ob dieser Pilz wirklich zu den Leptostromataceen gehört, ist mir sehr zweifelhaft, vielleicht würde derselbe besser in die Verwandtschaft von Haplosporella gehören, da die scheibenförmigen Stromata eingewachsen sind. Dieselben sind von den Conidien gänzlich erfüllt. Ausserlich hat derselbe mit Seynesia gewisse Aehnlichkeit, doch ist die Struktur nicht strahlig-zellig. (Hierzu Textfigur.)"

[Deuteromycetae]

SIROZYTHIA v. Höhnel n. g. Nectroideaceae. Annales Mycologici, 2:48. Jan. 1904.

"Pycnidiis globosis vel oblongis, immerso-erumpentibus, carnosulis, pallidis vel hyalinis, primum clausis, demum irregulariter dehiscentibus, intus dense sporophoris brevibus obtectis. Conidiis acrogenis, catenulatis, hyalinis vel pallidis, continuis, plerumque oblongis."

[Deuteromycetae]

TRACYLLA (Sacc. ut subg.) Fl. Tassi n. g. Leptostromaceae. [Type, Leptothyrium spartinae Peck.] Bullettino del Laboratorio ed Orto Botanico della R. Universita di Sienna 5:80. 1902.

INDEX TO NEW GENERA OF FUNGI PUBLISHED SINCE YEAR 1900.

NOTES FROM MYCOLOGICAL LITERATURE XIV.

W. A. KELLERMAN.

FUNGOUS DISEASES OF FRUITS IN MICHIGAN, B. O. Longyear, Agr. Exp. Sta. Special Bulletin 25, March 1904, is intended to serve as a sort of a text book of the diseases most common and destructive to fruits in that State. The illustrations are abundant, very good, and mostly original. As a convenient little hand-book this bulletin can be highly commended.

IN THE BULLETIN DE LA SOCIETE MYCOLOGIQUE DE FRANCE, Tome XX, 3e Fascicule, 20 Jouillet 1904 we find the following topics: Barbier, Agaricinées de la Cote-d'Or; Patouillard,

Champignons nouveaux des iles Gambier; Molliard, Forme conidienne de Sarcoscypha coccinea (Jacq.) Cooke; Delacroix, Champignons parasites sur les Cafeiers; Puttemans, Fumazine des Cafeiers, and Maladie du Cafeier produite par le Stilbella flavida; Maublanc et Lasnier, Sur une Maladie des Cattleya.

DR. FRANZ V. HOEHNEL publishes an interesting article, Ueber Myxosporium tulasnei, Myxolibertella und Sporodiniopsis, in the May No. of the Annales Mycologici, 1904. Among other things he remarks that Saccardo says sehr viele Arten der Section "Phomopsis" des Formgenus Phoma neben den Sporen noch fadenförmige, gekrümte Basidien abgliedern; but that he is convinced that these also are *spores* zweite Ordnung in case of Myxolibertella; he also says that this genus belongs to Melanconiaceae and is no *Phomopsis* (Sphaeropsideae). We quote again: Dass Sphaeropsideen häufig zweierlei und selbst dreierlei Sporen zeigen, ist bekannt . . . . So ist Thatsache, dass *Trichoderma lignorum* zu mindestens zwei verschiedenen *Hypocrea*-Arten gehört, und zweifellos, dass die Formspecies *Oidium erysiphoides* Fr. sogar zu verschiedenen *Gattungen* der Erysipheen gehört. Ebenso kann man die *Cystospora*-Formen vieler *Valsa*-Arten einfach nicht von einander unterscheiden, obwohl es ja sicher ist, dass sie specifisch verschieden sein müssen.

ANNALES MYCOLOGICI, Vol. II, No. 3, Mai 1904, contains: Horn, Experimentelle Entwickelungsänderungen bei Achlya polyandra de Bary; Rick, Ueber einige neue und kritische Pilze Süd-Amerikas; Höhnel, Ueber Myxosporium tulasnei, Myxolibertella und Sporodiniopsis; Constantineanu, Sur deux nouvelles espèces d'Uredinées; Bubák, Die Fruchtbecher von Sclerotinia alni Maul; Salmon, On Erysiphe graminis DC. and its adaptive parasitism within the genus Bromus; Zahlbruckner, Neue Flechten; Höhnel, Mycologische Fragmente, 10.; also Neue Litteratur, und Referate.

CRYPTOGAMAE FORMATIONUM COLORADENSIUM is the title furnished by Dr. Frederic E. Clements of the University of Nebraska, who plans to issue representative sets of Colorado cryptogams. The fungi will constitute the major part of the collection, though the mosses, liverworts and algae will be included. It is proposed to issue the collection, which will contain 600-800 numbers, in centuries, at the rate of one or two each year. The first century will be ready for distribution in the spring.

This collection is designed to be a contribution to the treatment of the cryptogams in the investigation of plant formations, and to supplement the *Herbaria Formationum Coloradensium*. The species will be arranged in the various formations with respect to position and abundance, though they may be distributed of course in the ordinary taxonomic herbarium. Group and portrait

prints of the most important species will average twenty to the century. For mycologists who wish them, water color copies of original drawings will be furnished of the fleshy fungi at the rate of ten cents per copy. The labels will be printed in Latin, and will be as full as possible. The price of the collection will be twelve dolars per century.

FROM THE BUCHHANDLUNG UND DRUCKEREI of E. J. Brills, Leiden, has been recently (1904) issued Icones Fungorum Javanicorum von O. Penzig und P. A. Saccardo. The text occupies 124 pages and the lithographic plates are 80 in number. All the new species, and new genera are included that were published by these authors in Malpighia (1897-1902), three articles entitled "Diagnoses fungorum novorum in insula Java collectorum." The authors well say: Da auch überhaupt, im Vergleich zu der ungeheueren Anzahl der bisher bekannten Micromyceten nur verhältnissmässig wenige Formen derselben durch Habitusbilder und Wiedergabe der mikroskopischen Charaktere illustrirt sind, so wird vielleicht die Abbildung aller jener neuen javanischen Pilze, die eine grosse Menge von Gattungen und Familien repraesentiren, nicht unwillkommen sein. The work can not be too highly praised nor its usefulness overestimated.

IN ATTI DELL' INSTITUTO BOTANICO DELL' UNIVERSITA DI PAVIA, Volume Ottavo, 1904, the following mycological articles appear: Uredo Aurantiaca n. sp., nuova uredinea parassita delle Orchidee, nota del Dott. Luigi Montemartini; Intorno ad nuovo tipo di Licheni a tallo conidifero che vivono sulla vite finora ritenuti per funghi, Ricerche di G. Briosi e R. Farneti; Contribuzione allo studio della Micologia Ligustica pel Dott. Angelo Magnaghi.

IN DOTT. ANGELO MAGNAGHI'S CONTRIBUZIONE ALLO STUDIO DELLA MICOLOGIA LIGUSTICA (Atti Ist. Bot. Univ. Pavia, 8:121-133, 1904) we find the descriptions of many new species of fungi, the hosts in many cases being cultivated in our greenhouses; for example: Macrophoma ligusticum Magn. in ramis emortuis Hydrangea hortensis; Macrophoma helicinum Magn. in foliis dejectis and Hederae helicis; Cytosporella citri Magn. in ramis emortuis Citri aurantii; Sphaeropsis magnoliae Magn. in foliis vivis Magnoliae grandiflorae; Aschochyta cliviae Magn. in foliis vivis Cliviae nobilis; Gloeosporium begoniae Magn. in foliis vivis Begoniae sp.; Colletotrichum pollaccii Magn. in foliis vivis Aucubae japonicae.

A LICHEN SOCIETY ON SANDSTONE RIPRAP is discussed by Bruce Fink in the Botanical Gazette, 38:265-284. The subheads are: Description of the Riprap, Ecologic Factors, Composition of the Lichen Society, Types of Thalli represented, Varying Ecologic Conditions and Distribution, Origin of the Society, Com-

parisons with other Similar Societies, Conclusion. The author says the facts show clearly some very evident adaptations in Lichen thalli.

DR. G. P. CLINTON HAS PUBLISHED AN EXHAUSTIVE MONOGRAPH ON THE NORTH AMERICAN USTILAGINEAE, Proceedings of the Boston Society of Natural History, Vol. 31, No. 9, p. 329-529, October, 1904. This is based on his study of this group for several years under exceptionable advantages. He gives keys to the genera, full synonomy, cities exsiccata, names hosts and indicates distribution by States. All descriptions are newly written; there are included also a list of host-plants alphabetical under Families, Distribution of Species by Continents, Literature (203 items), Index to Synonyms, and Types are cited. Several species are reduced to synonyms besides those given in the preliminary paper (in Jour. Mycol.); a dozen additional species are included besides another dozen of *New Species*. Illustration of all North American species by spore drawings we are told is under consideration.

THE SEPTEMBER NO. OF THE JOURNAL OF MYCOLOGY (1904) contained the following: Benjamin Matlack Everhart — Obituary; Morgan — Pyrenomycetes Scarcely Known in North America; Holway — Notes on Uredineae, III; Fairman —Some New Fungi from Western New York; Ellis and Kellerman — A New Phyllachora from Mexico; Kellerman and Ricker — New Genera Published Since 1900; Kellerman — Index to North American Mycology, Notes from Mycological Literature, XII.

IN DRITTER BEITRAG ZUR PILZFLORA VON TIROL von Fr. Bubák und J. E. Kabát, published in Oesterreichische Botanische Zeitschrift (the last installment in Mai 1904), many new species are described, also one new genus, namely, *Colletotrichopsis*. It differs from Colletotrichum durch die Lage der Borsten, die hier als eine Pyknidenwand fungieren.

P. HENNINGS DESCRIBES SEVERAL NEW SPECIES in Hedwigia, 43:147-9, 16 Mai 1904, under the title Einige neue Pilze aus Costarica und Paraguay. Of special interest we note his new species of a Rust on the potato, no uredineous species being hitherto reported on this host. The parasite in question is given as follows: Puccinia Pittieriana P. Henn. n. sp., auf lebenden Blättern von Solanum tuberosum L.

PROFESSOR B. M. DUGGAR PUBLISHES AS THE FIRST REPORT ON HIS EXTENDED STUDIES OF AGARICUS CAMPESTRIS, Farmers' Bulletin No. 204 (1904) on the Cultivation of Mushrooms. The description of the plant is followed by notes on Spores and Spawn, Commercial Mushroom Growing, Mushroom Enemies, etc. He points out the necessity of getting so-called virgin spawn which has never exhausted itself by the production of Mushrooms. It is now possible by means of chemical stimulation to germinate

the spores in quantity under "pure-culture" conditions. It is confidently expected that investigations in the course of another year will put it within the reach of any practical and experienced grower to develop spawn from spores of selected Mushrooms. By such methods one could select the particular Mushrooms from which spores are to be taken, and therefore constant selection and improvement will become possible. Success has also attended the effort to grow "spawn" from bits of tissue of selected Mushrooms in test tubes filled with sterilized stable manure or compost.

THE RELATIONSHIP OF SEXUAL ORGANS IN PLANTS by Bradley Moore Davis (Botanical Gazette, 38:241-264, 1904), though not primarily taxonomic and mycological, is an article that every mcyologist will desire to consult. The morphologist chiefly will be interested in the new terms used: Sporocyst, Gametocyst, Spermatocyst, Oocyst, Gametangia, Spermatangia (antheridia), Oangia (archegonia), Coenogametes.

OOGENESIS AND FERTILIZATION IN ALBUGO IPOMOEAE-PANDURATAE, studies by F. L. Stevens, is published in the October No. (1904) of the Botanical Gazette. It is a brief account, illustrated with two text-figures, touching only the salient features and those which present devergence from the usual types. The sexual organs and sexual spores are found in the hypertrophied parts of the host in such abundance as to render this species the most favorable of all of the genus for the study of Oogenesis and fertilization.

A PREVISIONAL LIST OF THE FUNGI OF NOVA SCOTIA is published by A. H. MacKay, in the proceedings and Transactions of the Nova Scotian Institute of Science, Vol. XI, part I, pp. 122-143, 1904. Most of the species are the higher fungi; one is doubtfully proposed as new, namely, Boletus dartmouthi.

THE GROWTH OF RAMULARIA RETICULATA is recorded by Albert C. Herre in the Botanical Gazette for September, 1904. He finds that near the Stanford University, California, various measurements show a growth of 17 to 91 per cent. in length from September to the following May. A single measurement showed that Parmelia caperata, growing on the trunk of Aesculus californicus, in the same time increased 1.5 cm. in longitudinal diameter, and 1.0 cm. in transverse diameter.

A NOTE IN SCIENCE, June 3, 1904, by Albert Francis Blakeslee, pertains to a somewhat extended investigation on the method of reproduction in one group of the common Moulds. Some of the facts are stated as at variance with the conclusions of other investigators. Zygospore production "(the author states) in the Mocurineae is conditioned by the inherent nature of the individual species and only secondarily or not at all by external factors. He

designates the species as *homothallic* and *heterothallic*, corresponding to monoecious and dioecious forms among the higher plants. Quoting again: In all species of both homo- and heterothallic groups the process of conjugation has been carefully followed, the swollen portions (*progametes*) from which the gametes are cut off do not grow toward each other, as currently believed, but arise as a result of the stimulus of contact between more or less differentiated hyphae (*zygophores*) and are from the outset always normally united.

THE SPHERE OF BACTERIOLOGY was the subject of a paper by Professor Edwin Oakes Jordan before the Section of Bacteriology, International Congress of Arts and Science, Universal Exposition, St. Louis, published in Science, Nov. 18, 1904. The interesting and instructive address closes with these words: It is not possible to estimate the loss to literature, science and art since the dawn of intellectual life which must be laid at the door of the infectious diseases. The relations of bacteriology to public hygiene, if properly appreciated and cultivated, will lead to an improvement in the conditions of life which will enhance both the ideal and material welfare of the race and will give greater assurance that each man shall complete his span of life and be able to do the work that is in him.

THE MYCOLOGICAL ARTICLES IN HEDWIGIA, Band 43, Heft 6, (3 Sept. 1904) are as follows: P. Hennings, Fungi amazonici III. a cl. Ernesto Ule collecti (Schluss); M. Britzelmayr, Ueber Cladonien-Abbildungen; Fr. Bubák und J. E. Kabát, Mykologische Beiträge II; J. B. Traverso, Eine neue Cercosporella-Art (S. compacta Trav.); P. Hennings, Cudoniella Mildbraedii P. Henn. n. sp.; P. Hennings, Einige von Herrn G. Feurich, Göda, im Königreich Sachsen gesammelte Sphaeropsidaceen; P. Hennings, Doassansia Renkaufii P. Henn. n. sp. auf Hydrocharis Morsus ranae L.

IN THE CONCLUDING PORTION OF "FUNGI AMAZONICI III. a cl. Ernesto Ule collecti" by P. Hennings [Hedwigia, 43:353-399, 3 Sept. 1904], the following new genera are described: *Saccardomyces* (*Englerulaceae* n. fam. Ascomycetae); *Perisporina* and *Zukaliopsis* (Perisporiaceae); *Asteropeltis* and *Phaeoscutella* (Microthyriaceae); *Metadothella* (Pseudophacidiaceae); *Cinnobella, Diplodiopsis*, and *Septodothidiopsis* (Sphaeropsidiaceae); *poropeltis, Peltistroma, Seynesiopsis*, and *Phragmopeltis* (Leptostromataceae); and *Bactridiopsis* (Tuberculariaceae).

IN HEDWIGIA, BAND 43, HEFT 3 [16 Mai 1904], we find the following articles on fungi: P. Hennings, Einige neue Pilze aus Japan (Schluss); P. Hennings, Einige neue Pilze aus Costarica und Paraguay; P. Hennings, Einige neue Pilze aus Japan II; P. Hennings, Fungi amazonici I. a cl. Ernesto Ule collecti;

P. Hennings, Fungi australiensis II; Fr. Bubák, Eine neue Agaricaceen-Gattung aus Böhmen; P. Hennings, Fungi S. Paulenses III. a cl. Puttemans collecti (Anfang).

New Genera of Fungi here given are published in Hedwigia, Band 43, Heft 4, (12 Juni 1904): *Hypoxylonopsis* P. Henn. n. (Dothideaceae); *Parmulariella* P. Henn. n. g. (Hysteriaceae); *Uleopeltis* P. Henn. n. g. (Hysteriaceae); *Rehmiomyces* P. Henn. n. g. (Bulgariaceae); *Atractina* v. Höhnel n. g. (Hyphomyc. dematicae phragmosp.; *Ioracterium* E. Jahn n. g. (Myxomycetae).

A new species of Polyporus from Tennessee, namely, P. arculariformis Murrill, is described and figured by William A. Murrill, in Torreya:4:150-1, Oct. 1904. It is a small plant near *P. arcularius* (Batsch.) Fr.

Fecundation in Plants, David M. Mottier, a book of 187 pages, has been issued by the Carnegie Institute of Washington, Publication No. 15. Many fungi are illucidated from this point of view, the whole article presenting the subject of fecundation in the vegetable kingdom by the discussion of concrete cases, selected from the great groups of plants certain typical representatives in which the sexual process seems to have been most thoroughly investigated. The sexual process is called throughout the work *fecundation*, not fertilization.

B. O. Longyear's Preliminary List of the Saprophytic fleshy Fungi known to occur in Michigan, Rep. Mich. Acad. Sci. (1902), 4:113-124, 1904, contains 486 names. Notes on habitat, abundance, date of occurrence, etc., are given, but no descriptions except of the Michigan new species published in previous Reports.

In the October No. of the Torrey Bulletin (1904) Julia T. Emerson publishes under the title, Relationships of Macrophoma and Diplodia, her proof of the identity of a Macrophoma (*Sphaeropsis palmarum* Cke.) with *Diplodia epicocos*—"there certainly seems to be no doubt that the unicellular white *Macrophoma* spores in the pycnidia are simply the immature forerunners of the mature *Diplodia spores*." The material for the cultures (on agar, potato, bread and milk, bread and water, and pith and blade of cocoanut leaf) was obtained in Jamaica, from various collections of cocoanut affected with diseases.

In Volume XII (May-October, 1904), of the Centralblatt für Bakteriologie, Parasitenkunde u. Infektionskrankheiten, we find the following mycological articles of scientific interest: Botanische Beschreibung einiger sporenbildenden Bakterien, Ernst Neide; Anhäufungsversuche mit denitrifizierenden Bakterien, G. van Iterson, Jr.; Bakterilologische Untersuchung ueber Bacillus

oleae (Arc.), Ruggero Schiff; Betrachtungen ueber die Verteilung der Uredineen auf ihren Nährpflanzen, P. Dietel; Contribution a l'etude de Cystopus candidus Lév., Albert Eberhardt; Zur Morphologie einer neuen Cystospora, R. Laubert; Infektionsversuche mit einigen Uredineen, II Bericht (1903), Fr. Bubák; Grundlinien zur Systematik der Saccharomyceten, Emil Chr. Hansen; Einige Beobachtungen über die Struktur und Sporen bildung bei Symbiotischen Bakterien, Em. Menel; Die Bakterienflora gesunder samen und daraus gezogenen Këimpflanzchen, Max Düggeli; Zur Kenntnis der Erblichkeit bei den einzelligen Organismen'; Die Verzweigung und Mycelbildung bei einer Bakterie (Bacillus berestnewi n. sp.), W. W. Lepeschkin; Beiträge zur Kenntnis der Eisenbakterien, B. Schorler.

The mycological articles of taxonomic interest or of other character than purely economic, printed in Centralblatt für Bakteriologie, Parasitenkunde u. Infektionskrankheiten, Zweite Abteilung, Bd. XI, Sept. 1903-Mai 1904, are as follows: Ueber den Zusammenhang zwischen Pleospora und Helminthosporium-Arten, II, H. Diedicke; Versuche mit heteröcishen Rostpilzen, W. Tranzschel; Studien ueber die Mikroorganismen des schwedischen Güterkäses, Gerda Troili-Peterson; Zur Kenntnis der Ueberwinterung des Oidium Tuckeri, Dr. Appel; Ueber den Gehalt der frisch gemolkenen Milch an Bakterien, Arthur Lux; 'On the discovery of cilia in the genus Bacterium, David Ellis; Die Ascosporen des Aspergillus fumigatus, G. Grijins; Kritische Studien ueber die Knöllchenbakterien, H. Süchting; A comparative and experimental study of bacilli producing red pigment, Mary Hefferan; Ueber den Kern der Bakterien und seine Teilung, F. Vejdovsky; Ueber einige in Kamerum auf Theobroma cacao beobachtete Pilze, Otto Appel und H. F. Strunk; Beiträge zur Kenntnis der Papilionaceen bewohnenden Uromyces-Arten, Ernst Jordi.

Annales Mycologici, Vol. II, No. 6, November, 1904, contains the following: Recherches morphologiques et Morphogéniques sur la membrane des Zygospores, par le Professeur Paul Vuillemin; New or Interesting California Fungi II, by Edward Bingham Copeland; Neue oder seltene Pilze aus Thüringen, von H. Diedicke; Rehm, Ascomycetes exs. fasc. 33; Revision der Gattungen Tryblidiella Rhydithsterium Tryblidana Tryblidium Tryblidiopsis, von Dr. H. Rehm; Sydow, Mycotheca germanican Fasc. V-VI (No. 201-300); Bemerkungen ueber Uredosporem von Uromyces brevipes und Uromyces punctato-straiatus, von P. Dietel; Notulae mycologicae, A. Trotter; Neue Litteratur; Referate und kritische Besprechungen; Exsiccaten. Six lithographic plates are used.

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W. A. KELLERMAN, PH. D., COLUMBUS, OHIO.

EDITOR'S NOTES.

The belated appearance of this number is much regretted, but was unavoidable by reason of the editor's late return from a winter trip to Guatemala and the many college duties that were imperative during the few weeks past. Though no excuse for this tardiness — it is a pleasure to state that many parasitic species from that mycologically unexplored region were taken in; it is predicted that a critical study of this material during the summer will reveal the presence of many very interesting species. It is safe to say now that only a few of the forms are those that are common in the United States.

In this No. we print the First Supplement to the New Genera of Fungi published since 1900 — giving, as in the first installment of this compilation, an exact transcript of the original description of each genus and the full citation; the arrangement is also the same — alphabetical under the main Groups of Fungi. It is believed that this series in the very near future will prove of great advantage to working mycologists. The Supplement as well as the first installment is reprinted on *one side of page only* — so that a card Index can be readily prepared by cutting up the reprint. Mycologists appreciate the advantage of this — and I would also call the attention of librarians to this, particularly those who are in charge of large Public Libraries and College Libraries.

An Index to be of the greatest value should be kept up to date — and therefore *guilty* is the pleading if one asks as to the Index to North American Mycology. But it will be resumed at the earliest possible moment and then an attempt made to avoid so great laggardness in the future.

The assembling of delegates at Vienna soon to deliberate over botanical matters too numerous to mention, will it is hoped (?) lead to reformation in many directions — mycological, typographical, etc.

Journal of Mycology, Vol. 11, pp. 49-104, Issued May 29, 1905.

Journal of Mycology Portraits with Facsimile Autographs.

Journal of Mycology

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A NEW CHAETOSPHAERIA.

A. P. MORGAN.

CHAETOSPHAERIA LUDENS Morgan sp. nov.—Perithecia globose, simply perforated, invested with long pale brown bristles, gregarious, seated on a very thin brown or blackish crust, scantily fibrillose. Asci 4-sporous, paraphysate, with a long stalk, 130-150 x 8-9 mic.; spores elliptic-oblong, slightly inaequilateral, obtuse at both ends, at first hyaline and simple, becoming brown and 1-3-septate, 17-20 x 7-8 mic.

Growing on old wood of Acer. Perithecia 0.4-0.5 mm. in diameter; the pellucid unseptate bristles 0.15-0.20 mm. in length. It is possible that two different species may be involved in Ch. pannicola (B. & C.) of the N. A. Pyrenomycetes; but the very different asci containing but four spores sharply distinguish our species from the one therein described.

NOTES ON THE ERYSIPHACEAE OF WASHINGTON.

BY W. H. LAWRENCE, AGR. COLLEGE, WASH.

1. ERYSIPHE CICHORACEARUM DC.[1]— On Artemisia ludoviciana, Aster fremontii, A. pessicae, Eriogonum elatum, Galium aparine, G. trifidum, Helenium autumnale, Helianthella douglasii, Helanthus annuus, Hiracium albiflorum, Hosackia purshiana, Hydrophyllum capitatum, Nemophila parviflora, and Stachys ciliata.

The forms of E. cichoracearum in this locality apparently have larger asci and spores than forms in other localities. The asci average 50-96 x 28-64 mmm. and the spores 25-35 x 19-26 mmm.

Two perithecia on Hosackia purshiana each contained but a single ascus.

2. ERYSIPHE GRAMINIS DC.— On Agrostis exarata, Bromus marginatus, and var. latior.

This species is widely distributed throughout the eastern portion of the state but is not very abundant.

3. ERYSIPHE POLYGONI DC.— On Clematis ligusticifolia, Epilobium sp., Hosackia denticulata, H. parviflora, Hydrophyllum occidentale, Lathyrus maritimus, L. polyphyllus, Lupinus leucophyllus, L. sericeus, Mentha canadensis, Pisum sativum, Polygunum aviculare, Ranunculus platyphyllus, Thermopsis montana (Idaho), Trifolium longipes, T. pratense, T. tridentatum and Vicia sp.

Both E. polygoni and Sphaerotheca humili were found growing together on Vicia sp. E. polygoni is a variable, widely distributed and abundant species.

4. MICROSPHAERA ALNI DC.— This species occurs in the Puget Sound region on Alnus rubra. Occasionally the host is infested with both M. alni and Phyllactinia corylea.

5. MICROSPHAERA ALNI var. CALOCLADOPHORA Schlecht.— This species is abundant on Quercus garryana in the Puget Sound region.

6. MICROSPHAERA ALNI var. VACCINII Schlecht.—A rare variety on Vicia americana in eastern Washington.

7. MICROSPHAERA DIFFUSA Cooke & Peck.—On Symphoricarpus racemosus. Widely distributed and very abundant.

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[1] Salmon (Mono. Erysiphaceae) in giving the distribution of E. galeopsidis DC. includes Washington. All the specimens I have examined have had a few perithecia with asci containing spores. Because of the presence of spores all forms have been referred to E. cichoracearum nothwithstanding the fact that the haustoria in some cases were deeply crenulate-margined.

8. PHYLLACTINIA CORYLEA Persoon. — On Alnus rubra, Cirsium lanceolatum, Cornus canadensis, C. nuttallii, C. pubescens, C. stolonifera, Crataegus douglasii, C. piperi, Dipsacus sylvestris, Epilobium adenocaulon, Erigeron concinnus, Fragaria bracteata, Holodiscus discolor, Lactuca scariola, Mentha viridis, Philadelphus lewisii, Plantago major, Prunus demissa, Pyrus baccata, P. rivularis, Rhus toxicodendron, Ribes divaricatum, Rosa gymnocarpa, R. pisocarpa, Rumex occidentalis, Salix cordata, S. rostrata, Solidago serotina, Taraxacum officinale, and Viola nuttallii.

A very common species. There is a marked difference in the diameter of the perithecia on some hosts; perithecia on Cornus nuttallii measure 150-200 mmm., on Crataegus douglasii 160-180 mmm., on Pyrus rivularia 180-215 mmm., on Ribes divaricatum 235-270 mmm.; on many of the other hosts there is not so marked a variation.

9. PODOSPHAERA OXYACANTHAE DC.— A rare species on Prunus cerasus, Pyrus baccata, Spiraea corymbosa and Symphoricarpus racemosus.

10. PODOSPHAERA OXYCANTHAE var. TRIDACTYLA Wallr.— On Prunus emarginata, P. persica and Spiraea douglasii. Endemic to the Puget Sound region in vicinity of Seattle.

One perithecium measuring about 100 mmm. in diameter contained two asci. Each ascus measured 64 x 64 mmm., globose but somewhat depressed on one side near the base. Each contained eight spores of normal size and shape.

11. SPHAEROTHECA MORS-UVAE Schweinitz.— A rather common species growing on the cultivated gooseberry in eastern Washington.

12. SPHAEROTHECA HUMULI DC.— On Arnica pedunculata, Bidens frondosa, Geranium incisum, Geum macrophyllum, G. strictum, Gilia gracilis, G. heterophylla, G. linearis, G. microsteris, Lophanthus urticifolius, Mentha canadensis. Polemonium micranthum, Potentilla convallaria, P. gracilis, Rubus nutkanus, R. spectabilis, Troximon nuttallii and Vicia sp.

13. SPHAEROTHECA HUMILI *var.* FULIGINEA Schlecht.—On Brunella vulgaris, Castilleia miniata, Gaillardia aristata, Geranium incisum, Lophanthus urticifolius, Matricaria discoidea, and Microsteris troximoides.

There is little ground on which to separate the variety from the species. The perithecia of the variety on the average are smaller and the difference in the size of the cells in the outer wall is fairly constant. Cells in the outer wall of perithecia on Mentha canadensis vary in diameter from 12-45 mmm., averaging about 15 mmm. The larger irregular cells had faint walls or lines representing lost cell walls. Perithecia on a leaf of Lophanthus urticifolius had quite regular cells varying from 8-20 mmm.; on

another the cells varied from 15-60 mmm., were very irregular in shape and were typical of the variety. In some perithecia taken from a single leaf of Brunella vulgaris the cells averaged 30 mmm.; in others 15 mmm.

14. SPHAEROTHECA PANNOSA Lév? — Mildew of the cultivated rose is common. The ascocarpic stage has not been collected on this host. The mildew is probably S. pannosa.

15. UNCINULA NECATOR Schweinitz.— On cultivated grapes in all grape growing districts.

16. UNCINULA PARVULA Cooke & Peck.—Collected on Celtis occidentalis in the Snake River Valley. Not very abundant.

17. UNCINULA SALICIS DC.— On Populus trichocarpa, Salix cordata, and S. scouleriana. Widely distributed but not abundant.

TWO NEW HAPLOSPORELLAS.

BY J. B. ELLIS AND E. BARTHOLOMEW.

HAPLOSPORELLA DIATRYPOIDES E. & B.— Stroma subcarinose, orbicular, black, 1-1½ mm. in diameter, sunk in the inner bark, circumscribed by a black line which does not penetrate to the wood; at first covered by the epidermis which soon ruptures and disappears exposing a cinereous-white disc pierced by the punctiform ostiola. Perithecia minute, 4-10 in a stroma. Sporules oblong or oblong elliptical, light brown, 10-14 x 5-6 μ.

When the epidermis falls away the exposed stroma resembles that of Diatrype albopruinosa (Schw.).

On dead limbs of *Ulmus pubescens*. Natoma, Kan. Jan. 8, 1904. (No. 3132).

HAPLOSPORELLA CERCIDIS E. & B.— Stroma minute, ¾-1 mm. in diameter, seated on the surface of the inner bark, semi-erumpent and surrounded by the stellately cleft epidermis. The exposed part of the stroma white — more distinctly so than in H. diatrypoides E. & B.— and as in that species, pierced by the black punctiform ostiola. Perithecia 2-6 in a stroma, minute. Sporules oblong or elliptical, 12-15 x 5-6 μ.

This is closely allied to H. diatrypoides E. & B. but it differs in its rather larger sporules, smaller stroma and in the absence of any circumscribing line.

On dead limbs of *Cercis canadensis*. Natoma, Kans. Jan. 8, 1904. (No. 3133).

THE ROSY SPORED AGARICS OR RHODOSPORAE.[1]

H. C. BEARDSLEE.

The Rosy Spored Agarics form an interesting group and one so favorable for study that it is proposed to give in successive Numbers of this Journal an outline of the group which shall help the beginner to recognize the common species. Care will be taken to point out the features by which the different groups can be recognized and figures of some of the more conspicuous and interesting species of each group will be given. The rarer species and those which are not well understood will not be considered.

HOW TO RECOGNIZE THE RHODOSPORAE.

When a basket of fresh specimens has been collected, spore prints should first be secured by removing the caps from selected specimens and placing them on white paper. In a few hours, if the specimens collected are in suitable condition spores will have fallen in sufficient quantity so that the spore-colors will be plainly shown. All the specimens whose spores have a distinct red or flesh color may then be selected out. These belong to the *Rosy Spored Agarics.* After a little practice many of this group can be recognized at first sight. The spores are often formed in profusion and give a pink tint to the gills, and often collect in masses on the gill and stem so that their color is readily seen.

THE GENUS CLITOPILUS.

This genus has rosy spores and may be distinguished from other members of the group by its solid stem and its decurrent gills.

KEY TO THE COMMON SPECIES OF CLITOPILUS.

The four common species may be distinguished by the following key:

Pileus white .... 1.
Pileus gray to brownish gray.......................... 2.

1. Pileus firm, dry, with a delicate white bloom....*C. prunulus.*
1. Pileus soft, slightly viscid......................*C. orcella.*

2. Pileus thick, fleshy........................*C. abortivus.*
2. Pileus thin, spores pale flesh color........*C. noveboracensis.*

[1] This article was prepared for the *Mycological Bulletin;* the editor asked permission to publish it in the JOURNAL with which request Professor Beardslee kindly complied.

CLITOPILUS NOVEBORACENSIS.—This species is abundant on the Asheville Plateau and may be found especially during wet weather. The pileus is dingy gray to pale in color, thin, with a distinct odor and a bitter unpleasant taste. The gills are crowded, pale, then dingy or yellowish. The stem is solid pale gray, with an abundance of white mycelium.

It may be of value to add that this species is doubtless identical with *C. popinalis* of Europe. Specimens and photographs have been submitted to eminent European authorities and this opinion definitely verified. Bresadola also states in a recent publication that the latter species is also the same as the European *Clitocybe amarella.* I have preferred here, however, to use the common American name.

CLITOPILUS ABORTIVUS is one of our common species. It is usually found growing in colonies on the ground or on well rotted stumps and logs. It is 2-5 in. broad, gray to brownish gray, not viscid, and is covered with a delicate tometum. The gills are pale gray, becoming rosy with the spores. The stem is solid and pale gray. Frequently clusters of plants are found which have not developed properly but have formed curious abortive masses from which the plant derives its name. The figure shows this peculiar feature well (Plate 76). This species is edible, though not of the best quality.

CLITOPILUS PRUNULUS and CLITOPILUS ORCELLA are close relatives and resemble each other so closely that photographs of each do not need to be given. Both are white and have decurrent gills and may be easily recognized from the photograph.

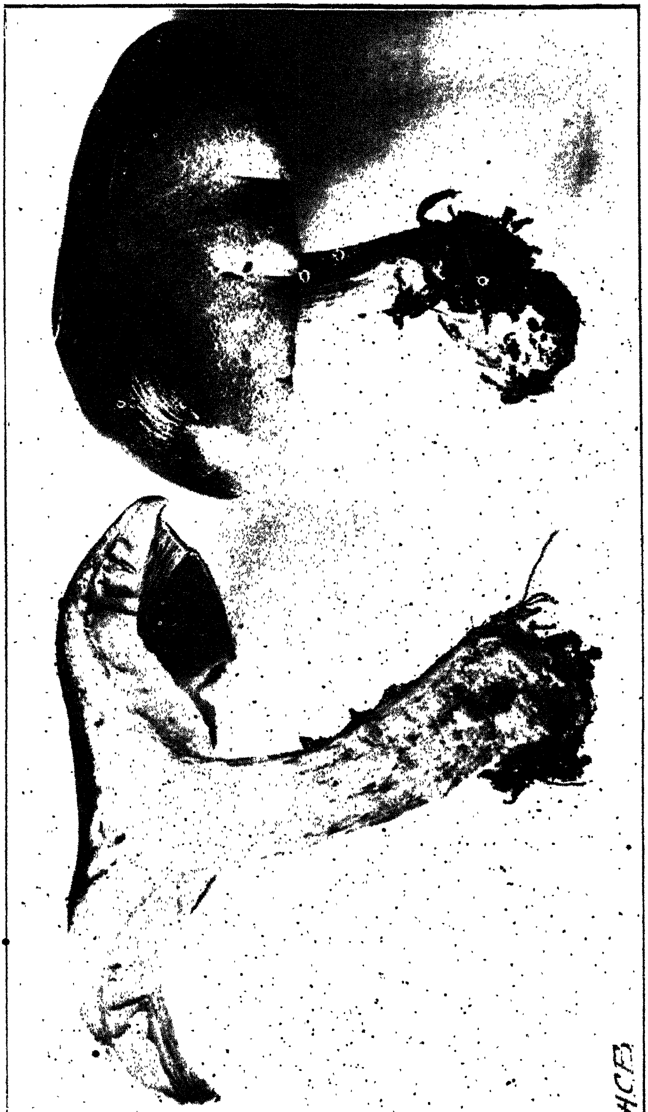
CLITOPILUS ORCELLA as noted in the key is slightly viscid, which is a convenient mark by which the species may be distinguished. Both are found in woods especially along woodland roads. They are both edible species of excellent quality.

EXPLANATION OF PLATES 76 AND 77.— In Plate 76 are shown above Clitopilus abortivus; both the normal and the abortive forms are given. Below are shown three specimens of Clitopilus noveboracensis.

In Plate 77 a half-tone representation of Clitopilus orcella is given. All the photographs were taken by H. C. Beardslee, Asheville, N. C.

CLITOPILUS ABORTIVUS.

CLITOPILUS NOVEBORACENSIS.



CLITOPILUS ORCELLA.

NOTES ON FUNGI II. WITH NEW SPECIES FROM VARIOUS LOCALITIES.

P. L. RICKER.

The type species unless otherwise designated are in the author's herbarium.

SPHAEROPSIDALES.

PHYLLOSTICTA AMPHIPTERYGII Ricker n. sp. — Spots subcircular, light-brown, 2-8 mm. in diameter, often confluent, with a slightly raised dark reddish brown margin; pycnidia scattered, black, epiphyllous, 55-80μ diam.; sporules oblong, often inequilateral, hyaline, bi-guttate, ends acute, 2.5-3 x 8-10μ.

On Amphipterygium amphifolium Hemsl. & Rose. Type specimen in the U. S. National Herbarium, collected by J. N. Rose and Jos. Painter, near Guadalajara, State of Jalisco, Mexico, Sept. 28, 1903.

USTILAGINALES.

TILLETIA ERAGROSTIDIS Clinton & Ricker n. sp. — Sori in ovaries, ovate to oblong, $\frac{1}{2}$-$\frac{3}{4}$ mm. long, infecting only a part of the flowers but showing quite conspicuously; spores globose to subglobose, dark brown, with regular reticulations (2.8-4.5μ projecting as a lighter zone 2.5-3μ), 25 37μ in diameter.

On Eragrostis glomerata (Walt.) Dewey. Type specimen 8841 S. M. Tracy, Yazo City, Miss., Sept. 8, 1904.

USTILAGO BROMIVORA F. de W. Specimens of Brachypodium distachyon R. & S. were recently examined, which were badly infected with a smut which proved to be an Ustilago. The characters and measurements agree in every way with this species and as the host is closely related to Bromus it seems best to refer the smut to the above species. Specimens collected by A. Letourneux, Mariut, Egypt, March 3, 1878.

USTILAGO DUTHIEI Ricker n. sp. — Sori in spikelets, infecting ovaries, which are scarcely larger than normal, inconspicuous until ruptured, spore mass olive brown; spores golden brown, ovoid to subspherical, 8-12μ diam.

On Andropogon bladhii Retz. Type specimen No. 7699, J. F. Duthie, Deнra Dun, India, Oct. 22, 1888.

A large number of smuts have been described on Andropogon but the above material does not seem to agree well with any of them described under Ustilago, using as a basis for the genus the characters outlined in Clinton's recent montograph. Neither do the spore measurements agree well with the species referred to other genera. It is difficult to tell without examining material

whether they have been properly referred or not. An examination of authentic material may reduce the above spcies to synonomy.

USTILAGO SIEGLINGIAE Ricker n. sp. — Sori in ovaries, ellipsoid, 3-4 mm. long, infecting most of the spikelets and showing conspicuously through the florets; spores elliptical to subglobose, reddish brown, at first appearance smooth walled, but on closer examination are apparently closely and minutely echinulate, 4-6μ diam.

On Sieglingia purpurea (Walt.) Kuntze. Type specimen collected by A. S. Hitchcock, Punta Rassa, Fla., July to August, 1900.

This species is most nearly related to U. triplasidis E. & E., but has constantly smaller spores.

USTILAGO STRUMOSA Cke. On the last of June, 1904, Mr. W. R. Maxon collected portions of a bamboo on the slopes of Monkey Hill, Jamaica, bearing a fungus growth about ¼-½ inches in diameter, somewhat oppressed and closely resembling a small Scleroderma externally. Unfortunately no fruit was collected, but the host was supposed to be Chusquea or Arthrostylidium. The host index failed to reveal anything suggestive of our specimens and after searching the literature of the Gasteromycetes it seemed that they might possibly be referred to Milleria Peck or Testicularia Klotzsch which is an older name, it having been first placed in the Gasteromycetes and later among the smuts. Since the material is abundant in the above locality Mr. Wm. Fawcett, Director of the Hope Garden, was able to inform us that the host was Chusquea abietifolia Griseb. It happens that Ustilago strumosa Cke. is the only fungus reported on the host and it seemed hardly worth while to look up the description, but curiosity as to what kind of an Ustilago could be found on a bambo led me to look up the description in Grevilliea, 9:98, 1881, and much to my surprise it was found to fit our specimens perfectly, which caused material to be sent to Dr. Clinton, who informed me that the species was undoubtedly a sclerotium belonging to Brefeld's genus Ustilaginoidea. The above species should then stand for the present as USTILAGINOIDEA STRUMOSA (Cke.) Clint. n. n. The sclerotia probably belong to some ascomycetous fungus. Mr. Fawcett has been kind enough to supply the author with additional sclerotia with which it is hoped to obtain the mature stage by cultivation.

TOLYPOSPORIUM GLOBULIGERUM (Berk. & Br.) Ricker n. comb. Thecaphora globuligera Berk. & Br. in Trans. Linn. Soc. Lond. II, 1:407, 1879. Testicularia leersiae Cornu in Ann. Sci. Nat. VI, 15:273. pl. 14, f. 6-10, 1883. Ustilago leersiae Durieu in Cornu loc. cit. 274 as syn.

Sori in ovaries subglobose or oblong, 1.5-2 mm. long, covered by a greenish, smoth membrane which upon rupturing exposes a black granular spore mass; spore balls black, opaque, globose to oblong and often irregular and angled, firm, composed of many spores, 80-235μ long; spores lighter colored, globose to subglobose, adhering by dark folds in the outer memberane which on separating give the spore an echinulate or tuberculate appearance, 7-12μ diam.

On Homalocenchrus hexandrus (Sw.) Kuntze. Type described from specimen in the herbarium of L. R. Tulasne in the Paris Museum, collected by Letourneux in Algeria, Aug. 1862. Also collected by F. M. Bailey, Brisbane So. Australia; Elihu Hall No. 760, Mumford, Tex., June 8, 1872 and T. H. Kearney No. 41, Mobile Ala., July 5, 1895.

Only the last two collections have been examined but the full descriptions and figures leave no doubt as to the identity of the species. McAlpine, Syst. Arr. Austral. Fungi, 186, 1895, reports Thecaphora inquinans B. & Br. as on the above host but it was originally found on Paspalum and is probably an erroneous determination.

UREDINALES.

Puccinia actinomeridis Magnus. — This species was described by Dr. Magnus as being found on Actinomeris squarrosa, along the Potomac River near Washington, D. C., Oct. 1897. A careful search of the region during the fall for the last three years failed to reveal any Actinomeris squarrosa, which is now caller Verbesina alternifolia, with rust on any part of the plant. Verbesina occidentalis however is very abundant in the region covered by Dr. Magnus on the trip on which the above was collected and it is usually badly rusted. This fact led me to be suspicious of the determination of the host and of the value of the species. I have not been able to verify this suspicion until recently when Mr. E. W. D. Holway was kind enough to send me some fragments of the flower from type material distributed in Vestergren, Microm. Rar. Select. No. 380. Verbesina alternifolia nearly always has winged achenes which Dr. Magnus' specimen does not have. The material of this collection in the Department Herbarium has been with a lot of undistributed material for some time and not easily accessible, but after hunting over several hundred envelopes it was found. The envelope contained enough of the plant to show that its branches and leaves are opposite which is never the case in V. alternifolia. The material is positively Verbesina occidentalis, the rust on which is considered by most mycologists to be Puccinia verbesinae Schw. Mr. Holway was also of the opinion when he sent me the material that Dr. Magnus' species could not be distinguished from Puccinia verbesinae Schw.

PUCCINIA AELUROPI Ricker n. sp. — Sori amphigenous, mostly hyphophyllous, elliptical or oblong, often confluent; medosporo light yellow, elliptical or oblong, minutely verrucose, pores several and scattered, 22-30μ; teleutospores clavate to elliptical or oblong, apex dark golden brown, rounded, thickened (up to 11μ), lighter below, slightly constricted, 19-25 x 30-54μ; pedicels equaling the spores, hyaline.

On Aeluropus littoralis Parl. collected by Frick, Caucasus Mts., (type); Schrenck, Songoria, China, and on Aeluropus macrostachyus Hack., collected by A. V. Munro, Quetta, N. W. India.

PUCCINIA KREAGERI Ricker n. sp. — Sori hypophyllous, inconspicuous, ferruginous; uredospores globose to subglobose, 22-27μ, very light yellowish or almost colorless, wall thin, minutely verrucose, pores several and scattered; teleutospores oblong-ovate, 16-26 x 33-46μ, constricted at the middle, rounded at the base, yellowish-brown, wall medium thick, apex darker and thickened (up to 8.5μ) rounded or acute; pedicel tinted, short (up to 15μ), fragile, 8-9μ wide.

On leaves of Festuca subulata Trin. (*F. jonesii* Vasey) Type No. 38 F. O. Kreager, Clark Springs, 10 mi. No. of Spokane, Wash., June 26, 1902.

PUCCINIA PARADOXICA Ricker n. sp. — Sori hypophyllous, narrow, linear, inconspicuous, darkening the epidermis above; teleutospores golden brown, symmetrical, elliptical, constricted at the middle, conspicuously verrucose, 22-29 x 33-37μ; pedicel short, hyaline, deciduous.

On Melica smithii (Porter) Vasey. Type collected by C. F. Wheeler, Chatham Station, Mich., August 22, 1900.

The verrucose teleutospores at once distinguish this from any other Puccinia on the grasses.

PUCCINIA PIPERI Ricker n. sp. — Sori hypophyllous, inconspicuous, linear, often confluent, epidermis persistent; uredospores elliptical to subglobose, light yellow, echinulate, 16.5-23 x 23-26μ; teleutospores clavate to cylindrical, golden brown, 22-26 x 53-62μ, apex usually flattened or sometimes rounded, not thickened, wall thin, slightly constricted at middle, covered with longitudinal angles giving a striated appearance; pedicel fragile, short, hyaline.

On Festuca pacifica Piper ined. Type No. 6502 C. V. Piper, Eight dollar Mt., Oreg., June 12, 1904.

At once distinguished from any species reported on Festuca or a related genus by the longitudinal angles and absence of thickened apex of the teleutospore and hyaline pedicel.

PUCCINIA LEPTOSPORA Ricker n. sp. — Sori amphigeneous, mostly hypophyllous, conspicuous; spores golden brown at apex,

which is thickened and coronate, gradually becoming lighter towards the pedicel, elongated-clavate, 16-20 x 84-112μ, fragile at base; pedicel very short, hyaline, fragile.

On Trisetum virletii Fourn. Type collected by Dr. C. A. Purpus, Ixtaccihuatl, Mexico, 1903, altitude 7-8000 ft.

Somewhat resembling Puccinia rhamni but at once distinguished from it or any related species by the extremely long narrow teleutospores.

Uromyces clignyi Pat. & Har. — On Andropogon schottii Rupr. No. 7, Dr. E. Palmer, Chihuahua, Mex., Aug. to Nov. 1885. On Andropogon hirtiflorus Kth., E. W. D. Holway, Guadalajara, Mex., Oct. 12, 1903; No. 21, T. S. Brandegee, San Francisquito, Mts., Lower Cal., Oct. 18, 1890; On Andropogon liebmannii Hack. No. 227, Dr. E. Palmer, Mexico, without further data.

The material here referred was at first taken for a good new species. I am however indebted to Mr. E. W. D. Holway for data regarding the type which he has examined. The uredospores in the description are immature teleutospores. The following characters are drawn from the above specimens:—

Sori hypophyllous, linear to oblong or oval, $\frac{1}{8}$-$\frac{1}{4}$ x $\frac{1}{4}$-1 mm., dark brown, thickly scattered but seldom confluent, tardily naked, giving the surrounding epidermis a light reddish tinge; uredospores globose or subglobose, 22-29μ, light yellowish, echinulate, wall medium; teleutospores dark brown, globose to subglobose, 22-31μ; wall thick (up to 5μ) smooth; pedicel hyaline, flexuous, equaling or slightly longer than the spore, 2-6μ wide, often forming a prominent rounded enlargement at the base of the spore or gradually tapering to the end.

But very few perfect sori can be found, the larger part of them being thoroughly infested with Darluca filum (Biv.) Cast., so that no spores or only fragmentary or immature ones remain in the sorus. This seems to be the case with a large number of tropical and subtropical grass rusts examined recently. In many of them so infected careful search fails to reveal anything more than a few uredospores, and they often in very poor condition. But for this parasite either a large number of additional grass hosts for some species of rust or else several new species of rusts might be easily determined.

U. S. Department of Agriculture,
Bureau of Plant Industry.

RUST NOTES FOR 1904.

J. M. BATES.

At Callaway, Neb., I had the opportunity, in 1902-3, of making some observations on the relations between the Puccinia on Distichlis stricta and the Aecidium on Chenopodium album and C. leptophyllum that led to the cultures of these aecidia by Dr. J. C. Arthur, from material sent by me. At the same time I collected Aecidium on Cleome serrulata and Lepidium apetalum in equally close connection with the Distichlis rust. But knowing little, at the time, of the investigations in rust relationships, I placed no importance on the facts. In January 1903 I moved to Red Cloud, Webster Co., and had an equally good chance to study the Distichlis rust; and a growing interest in the whole subject. Here I found the Aecidium on Cleome and Lepidium in such close relation with Distichlis as to convince me that they were mutually dependent the one on the other, and so wrote to Mr. Holway. He replied that no rust had been known to occupy the plants of more than one order, and that my claim was hardly tenable.

I watched the early Uredo form on Distichlis with no other Aecidium at hand but that on Cleome, and my conviction grew, so that in 1904 I asked Dr. Arthur to test the matter with my teleutospores. In two or three weeks I learned from him that the test was a success on Cleome and Lepidium. I then began further investigations, having in the meantime found abundant aecidia on Salsola tragus, under the same conditions that surrounded the Cleome, with no room for doubt that it came from Distichlis.

It seemed that there was no reason why I should not find it on others of the Cruciferae growing under the same conditions. The hunt was made and the aecidia found on Sophia incisa and Roripa sinuata May 25, and on Bursa bursa-pastoris May 31. It affected stems and leaves about equally in proportion to surface exposed. I would not think from the amount found that these genera were as susceptible as Chenopodium and Lepidium. The aecidia were magnificent on both last year. I made some cultures on both genera in May, and had apparent success; but such out-door cultures are not of much scientific value, in the neighborhood of the real thing. Chenopodium hybridum failed to show inoculation. The plants may have been too old (6 in. to 12 in.). I hope to try young plants this year.

We evidently have here a cosmopolitan rust, wonderfully adaptable. I see no reason to think that its possibilities have been exhausted by these finds, four of which I suppose are new to science. Let others who live near this grass rust follow up the clue here given, as I hope to do still further.

May 23, I found one strong plant of Astragalus lotiflorus nebraskensis Bates, the only one found within 30 miles. It was well covered with Uromyces astragali, which heretofore has been confined in Nebraska to Astragalus mollissimus and adsurgens. It is common on the former 30 miles west, but I have not found it on that host here, though the host is abundant. I took leaves of this, and laid them in among the leaves of A. shortianus May 28, and later, with no infection. May 29, I did the same to A plattensis and A. crassicarpus, a mile away. June 14, both plants were well infected. A. plattensis however carried on the disease through the season with more vigor, proving the better host.

Red Cloud, Neb., March 7, 1905.

SOME SUGGESTIONS FROM THE STUDY OF DAIRY FUNGI.*

CHARLES THOM.

The importance of certain saprophytic fungi in the arts has only begun to be realized in recent years. Nevertheless numerous papers chiefly chemical have already dealt with the effects of such organisms upon many organic media. It is when one is confronted with one of these problems as a practical proposition and tries to utilize the results of mycological work already published, that he begins to realize the hopeless muddle of our present nomenclature and descriptions in certain cosmopolitan genera.

In the beginning of the dairy investigation with which I am connected I encountered several problems. Nearly all the studies upon milk and milk products have been the work of bacteriologists, consequently when dairy fungi have been concerned these studies are almost purely physiological. In fact in very few cases has sufficient attention been given to the morphology of the forms studied to make their identity in any degree certain. Similarly a number of chemical investigators have studied the effects of fungi upon special media without proper studies of morphology. Thus we find a considerable mass of literature representing a great deal of work in which the species involved can scarcely be determined. So little importance has been attached to species that the author of a recent paper when asked for a culture of his organism replied, that any green Penicillium would produce the same effects. Nevertheless such wide divergence of results as we find in papers dealing with organisms for which the same specific name is used indicates that the

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* Published by permission of the Chief of the Dairy Division of the Bureau of Animal Industry.

authors are really using quite different species. If some one were to collect all the effects ascribed to Penicillium glaucum he would be convinced that it was the most versatile organism on earth. But a considerable acquaintance with green Penicilliums leads to the reply that the real organisms involved would make a most motley collection.

In the first place it is perhaps needless to say that most dairy fungi are cosmopolitan saprophytic species. In addition to these any saprophyte or even parasite capable of growing in milk or common culture media may be found there at times. Although this latter group may be numerous at a particular time and place they are comparatively easily distinguished from that special lot of species which are almost universal in dairy cultures. Here we encounter a great difficulty. Mycological literature is full of descriptions of saprophytes such as Penicillium, Cladosporium, Aspergillus, Fusarium, Alternaria, and worse still Monilia and Oospora (Oidium) in which brief notes upon a single colony of fungus upon a named substratum are the only basis for identification. In these one feels fortunate when he finds a spore measurement. Too commonly the substratum named is either unique or very vaguely defined, while the suggestion of culture is a rarity. Satisfactory identification a second time by another worker might occur, but only accidentally.

Dr. Fr. Dierckx in speaking of the genus Penicillium (translating freely), says, "For the genus Penicillium it is only exceptionally possible to identify a type met by accident upon accidental substratum, without cultivation. In fact the molds vary immensely according to the circumstances under which they are observed." He continues saying that in such a genus the only hope for stable identification is in culture for several generations under "rigorously uniform conditions."

This paper attempts to present a plan for obtaining more definite knowledge of these forms by the dairy student in the use of his own methods. The media used have been the nutrient agar and peptone milk-sugar-gelatine described by Conn (Bact. in Milk and its Products p. 253, 268) in addition to ordinary potato agar and potato plugs. Special experiments have involved many other media. These cultures were commonly acidified by two to five drops of normal lactic acid to exclude bacterial growth. Once freed from bacteria the fungi were studied in both acid and neutral media.

It is useless to say that any classification of such forms as Penicillium and Aspergillus, to be of value, must rest upon ascus formation. The discovery of such fruit or methods of inducing its formation in particular species is of much interest, but since the vast majority of the species concerned have failed to produce asci under stress of thousands of cultures by numberless

students it becomes economically necessary to find some means of satisfactorily describing the forms we have.

The method of identifying by hosts or substrata has wrought endless confusion. Many of these species are cosmopolitan and omnivorous in their conidial or hyphomycete form. Not only so, but they present morphological adaptations to different substrata. I cannot agree with the author who recently described a Fusarium as new, with the plea that the possibility of finding it already described involved much labor and anyway (translating) "Just as many species of Fusarium are made as there are host plants found infested with Fusarium." Such a study to be of value to-day must present both morphology and physiological effect under known and easily reproduced conditions.

But since my specific problem is cultural, and since the importance of these organisms is due to their constant presence in all cultural work, in the dairy, in the household, in every form of manufacture which offers food material to omnivorous organisms, I set out the definite task of finding to what extent it is possible to find reliable diagnostic characters in their relations to standard culture media. In the discussion I will draw my suggestions from comparative studies of some fifteen species of Penicillium.

Every Penicillium appearing in hundreds of plates in two dairy bacteriological laboratories was isolated and studied. Many more have been secured from distant laboratories. Series of petri-dish cultures representing every form found have been made and constantly watched for diagnostic characters. Easily confused forms have been grown in parallel cultures for generation after generation that such differences as appeared should be fully tested. The same species has been cultivated on gelatine, agar, potato, cheese, milk, caseine, manure, wood, Raulin's fluid, and other special media. Stimulation by acids and alkalies and by the excretions of other fungi and bacteria has been tried. In spite of all the changes in morphology and effect, due to such treatment, a return to the original gelatine has in most cases brought with it a remarkably constant return to the same structures and effects as upon the plates first thoroughly studied. In cases of special difficulty several forms are carefully inoculated into one cold poured plate and their positions marked and their entire course of development is watched under conditions whose uniformity cannot be questioned. Thus the question what characters may be depended upon as constant under constant conditions, has been kept always in view. This is in direct contrast to those special investigations where the authors have set themselves to the task of inducing and describing variations in particular species. Such studies have commonly given very little attention to the problem of furnishing adequate means

by which others could be certain they were in possession of the same species. It is manifestly impracticable to repeat a long series of variation experiments with a number of different fungi simply as a means of identification of a form sought. It seems, therefore, very desirable to present the results of an effort to find the simplest means of characterizing species.

In attempting to develop a method of description which will be practicable, I have limited the media used as much as possible. Within this limitation attention is directed to such morphological and physiological characters of the colonies as seem to be of real value. A card on the plan of the bacteriologists' has been prepared for rapid comparison of results. There are abundant weaknesses in this method, but it is intended to call attention to important and easily observed differences between forms, and ample provision is made for the usual complete written description is well. Such description makes necessary the adaptation and definition of a set of terms to avoid confusion, and one must recognize as well that no set of terms was ever completely satisfactory to describe living things. If we remember then that a series of observations must cover the whole growing and fruiting period of the species, perhaps for several generations, we will find some such system as I now propose, suggestive at least.

The characters used may be best examined separately.

I. *Relation to Culture Media.*

1. *Fruiting period.*

In studying a series of cultures it may be very readily shown that under exactly the same conditions two species may develop from the spore to the ripe fruit in very different times. Whether this minimum period is the same or different, its relative length is fairly constant for the two, and this commonly remains true under changed conditions. For example, the Penicillium used in ripening Camembert cheese was first separated from contamination by its much slower development than the entirely worthless species mixed with it. Similarly the length of the period during which spores are produced varies greatly. Some species produce spores from a single set of conidiophores in a very limited period then die — apparently. Others produce a succession of conidiophores from the same mycelium, which requires a much longer period so that the maximum time for different species varies from a few days to several weeks on exactly the same media. Whether the limitation of period is due to definiteness of life cycle or to excretory products which inhibit further growth is unsettled, but the fact of limitation is reasonably clear in many species where the substratum is in no way exhausted.

2. *Gelatine.*

The diagnostic value of the liquefaction of gelatine is questioned by some, but within certain limits I believe it to be very useful. Colonies of some species never produce such liquefaction, other colonies will be floating entirely free in a pool of liquid within a week (ex. Cladosporium herbarum) and always produces such an effect. The character is very reliable as an accessory to other data; in such cases many species produce slight liquefaction, some liquefy the gelatine under the center of the colony, remaining always with at least a sterile vegetative border of mycelium in the solid substratum, some produce a semi-liquid condition in the whole plate but no watery fluid. In these latter cases especially this is difficult to describe accurately and perhaps unreliable because the extent of change is often both variable and dependent upon conditions which cannot be accurately determined. However, this indefinite condition should be described and recorded as carefully as observations will permit. Whether the liquefaction of gelatine is to be regarded as an index of enzyme production will be discussed in another paper, but the question is entirely too indefinitely understood to give it a diagnostic value as great as some bacteriologists assume it to have. Further, it must be noted here that the same species gives different reactions to gelatine media of different formulae so that much care is necessary in stating results of this kind.

3. *Indicators.*

The introduction of a sterile solution of litmus or other indicator gives many interesting contrasts. With litmus in media acidified by two to five drops of normal lactic acid, cultures of some species uniformly show a prompt and sharp change from red to blue, beginning as soon as the growth becomes visible to the eye. Cultures of other species show no change for several days, the time here being fairly characteristic, then with the change of color in the fruiting portion of the mycelium (or about that time) the medium begins to turn blue below the center of the colony and this color progresses outward until usually the entire plate or tube of medium has become blue. In still other species a red medium remains red during its entire growing, and fruiting period. If the medium be neutral or alkaline those which turn red to blue will leave the blue entirely unchanged, others will change the blue to red for a time varying with the species after which it progressively changes back to blue, beginning at the center as before; others will turn the blue to red and it will remain so. Similarly here we find every gradation in rate and intensity of action which brings into notice some species whose effect is neutral, giving the shades of color characteristic of the turning point of litmus and other species in which discordant results are obtained from causes not yet determinable. Such

difficulties are special cases and do not destroy the significance of the definite conduct of very many species. The value of other indicators has not been tested sufficiently to report results. Very few of the species tested so far, carry the medium to the alkaline side of Phenolphthalein, though several of the more strongly alkaline forms have done this.

4. *Secretions.*

Pigment production.— Some species produce pigments which are secreted, or perhaps better, excreted, into the substratum. Among the species of Penicillium studied at least two produce bright yellow pigment in considerable quantity. Several more at times exhibit a trace of this ability. Pigment production is dependent apparently upon the substratum. Neither of these species produce any color within potato agar but both will rapidly turn a tube of milk yellow or cause large patches of yellow on bread, or potato plugs. This yellow pigment is soluble in alcohol. The whole question of pigments is, however, so imperfectly known that its diagnostic value is very doubtful except in a few cases.

II. *The Colony Itself.*

Confronted with the necessity of being able to distinguish certain species, I next turned to the colonies and sought for characters which might be of value. Not to review failures certain points have proved to be fairly reliable. Approximate uniformity of media must be kept in mind, but the ordinary differences between successive lots of gelatine or agar upon the same formula do not seem to disturb these relations in the species I have studied. I am informed by Dr. Haven Metcalf of Clemson College that the slightest changes in the medium do produce striking morphological changes in certain species of Frusarium.

1. *Color.*

The color and color-changes of colonies though difficult to describe must be observed and recorded for the entire growing period. In spite of the haziness of nomenclature in greens, blue greens, greys and browns, general distinctions can be made and are fairly reliable. Improvement in color charts would aid matters greatly. Milburn has recently shown that changes in acidity of media in certain cases cause radical changes in the color of spores, and similarly variations in illumination and osmotic pressure affect the pigments in the spores of Hypocrea. Although my experiments with Penicillium have not yet produced such results this observation has been made upon P. glaucum by Dr. O. Stoll in a recent paper. This makes thorough knowledge and statement of conditions very necessary to uniformity of results.

2. *Surface.*

The comparison of hundreds of cultures of familiar species shows that the general appearance or texture of the adult colony is fairly stable. I have designated this in my description card as the "surface" of the colony. In comparing such surfaces two general types are seen: one, those in which every conidiophore or the vast majority of conidiophores in the growing portion of the colony arises directly from the submerged mycelium through the culture media; the other, those in which the conidiophores are produced as lateral branches of matted aerial hyphae. The first type results as a rule in a colony which lies very close to the substratum without loose networks of hyphae and may be designated as "*strict*;" the second, a piling up of masses of loose hyphae which may be called "*floccose*." A strict surface may be *close* where the fructifications are barely elevated above the medium making a smooth area or *lax* if the conidiophores are longer and give a velvety appearance. Floccose surfaces may be loose or closely woven, felted or tufted, stilboid (bearing large coremia), stolon bearing or composed of divergent ropes of hyphae or aerial hyphae may be so sparingly developed as to appear *strict*. Such a colony might be styled *appressedly floccose* or *falsely strict*.

3. *Margin.*

In discussing the surface of the colony the fact was brought out that the borders of the rapidly growing colony show much more uniformity than the center which has ceased growing. Study of the margin in the old colony is usually valueless, but during rapid growth it shows how the fungus spreads in the substratum, the branching, septation and measurements of the hyphae, and the origin of all aerial structures. One has for example but to study the growing border of a single colony of the common Oidium (Oospora) lactis to recognize its peculiar dichotomous branching, anywhere afterward. Two types here will include by far the larger number of species. One may be called "indeterminate." In this group the submerged vegetative mycelium forms a distinct band beyond the aerial and fruiting portion. In the other for which the term "determinate" is much less accurate, the aerial portion travels or appears on the surface as fast as the vegetative mycelium spreads in the substratum. An indeterminate or diffuse colony will show a succession of fruiting branches from conidiophores with ripe fruit in the center, to delicate rudiments just breaking singly through the surface at the margin. Such a colony will show a marked tendency to spread all over whatever surface is offered to it. A determinate colony is usually restricted in growth. Fully-formed fruit will often be found at the very edge if the colony is strict, with a very

narrow border of white if any appears. In a floccose colony loose aerial hyphae with or without fruit will spread as fast in the rapidly growing period as the vegetative hyphae. Later this balance is destroyed in some species so that they appear almost as if indeterminate.

4. *Conidiophore.*

The conidiophores are a variable quantity. There is, however, a general type or series of types in each form which is found of value. The length of the conidiophores, their septation, the diameter of their cells, and especially their origin and relation to the substratum and to each other are sufficiently characteristic to be very useful.

5. *Fructification.*

The term fructification may be best made to include the chains of conidia and the basidia and branches bearing them back to the first branch from the main conidiophore. Such fructifications are variable and exceedingly troublesome to figure satisfactorily. The data which are offered vary with the species, but include the mode of branching, the measurements of the basidia, the relation of the branches and basidia to each other, the collocation of the chains of conidia, and, perhaps the most useful of all, measurements of the limits of total length and breadth of the whole fructification. In some species the chains are widely divergent, in others joined into a column. In some all the basidia are in a single verticil, such a fructification may be called *simple*. In others the first branch is divergent giving a *falsely double* effect. A conventionalized diagram of a series of fructifications enlarged about 100 diameters and sketched under the camera-lucida shows very striking contrasts between different species.

6. *Conidia.*

With reference to the conidia there is no departure from the usual data,—size, color, presence or absence of a connective, mode of germination, markings on surface, tendency to adhere or separate freely, rapidity of growth and resistance to destructive agents or conditions.

A long series of cultures indicates that for the genus Penicillium at least these characters form a practicable basis for description and it seems reasonable to believe from comparative cultures already made that the same plan could have much wider application.

Storrs Agricultural Experiment Station.

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USTILAGO nealii Ell. & And., *syn. of Sphacelotheca nealii q. v.*

USTILAGO Pers., *syn. of Ustilago q. v.*

USTILAGO piperii Clint. n. sp. on Polygonum davisiae. Proc. Boston Soc. Nat. Hist. 31:382. Oct. 1904.

USTILAGO piperi Clinton s. p. Hosts: Polygonum davisii and P. phytolaccaefolium. Proc. Boston Soc. Nat. Hist. 31:382. Oct. 1904.

USTILAGO rumicis (Berk.) Clinton n. sp. Hosts: Rumex acetosella and R. hastatulus. Proc. Boston Soc. Nat. Hist. 31:380. Oct. 1904.

USTILAGO rumicis (Berk.) Clinton n. sp. [Ustilago utriculosa var. rumicis Berk.] Hosts: Rumex acetosella and R. hastatulus. Proc. Boston Soc. Nat. Hist. 31:385. Oct. 1904.

USTILAGO Rouss. [Necrosis Paul., Ustilago Pers., Ustilagidium Herzb.] Proc. Boston Soc. Nat. Hist. 31:336. Oct. 1904.

USTILAGO scolochloae Griff., synonym of U. arthurii Hume. [Clinton.] Proc. Boston Soc. Nat. Hist. 31:373. Ost. 1904.

USTILAGO strangulans Isaat., *syn. of Sphacelotheca strangulans q. v.*

USTILAGO triplasidas Ell. & Ev. n. sp. Host: Triplasis americana. Proc. Boston Soc. Nat. Hist. 31:355. Oct. 1904.

USTILAGO utriculosa var. rumicis Berk., *syn. of Ustilago rumicis Clint. q. v.*

VERPA chicoensis Copeland n. sp. in nemore graminoso. Ann. Mycolog. 2:508. 10 Dec. 1904.

VOSSIA Thüm., *syn. of Neovossia q. v.*

WATERS, C. E. Geotropism of Polyporus. Plant World, 7:224. Sept. 1904.

YUCCA sp., host to Coprinus bakeri Copeland n. sp. Ann. Mycolog. 2:507. 10 Dec. 1904.

ZIZANIA aquatica, host to Entyloma pammelii Hume n. sp. Proc. Ia. Acad. Sci. 9:238. 1902.

ZYGOSPORE Formation a Sexual Process. Albert Francis Blakeslee. Science, N. S. 19:864-6. 3 June 1904.

NOTES FROM MYCOLOGICAL LITERATURE, XV.

W. A. KELLERMAN.

In Bulletin trimestriel de la Societe Mycologique de France, Tome XX, 4e Fascicle (31 Dec. 1904) the following articles appear: L. Rolland, Champignons des iles Baleares, Pl. 9 et 10; L. Lutz, Notes mycologiques: Ergot du *Psamma arenaria.* — *Sclerotinia Fuckeliana* sur les Quinquinas de culture de serre; P. Vuillemin, Les *Isaria* du genre *Penicillium,* Pl. 11; M. Molliard, Un nouvel hote du *Peronospora Chlorae;* M. Marbier, Agaricinées critiques de la Cote-d'Or; A. Maublanc, Maladies des Olives, due au Macrophoma dalmatica (Thuem.) Berl. et Vogl. — A propos du *Dasyscypha calyciformis* (Willd.); E. Lasnier. Maladie des Pois causés par le Cladosporium herbarum, Pl. 12.

Letters on the Diseases of Plants by N. A. Cobb, is Miscellaneous Publication No. 666 of the Department of Agriculture, Sidney, New South Wales. It is a pamphlet of 133 pages; contains over 150 original illustrations; seven original colored plates; and four copied plates. The diseases and the parasitic fungi are outlined in popular form and remedies suggested.

On the Fertilization, Alternation of Generations and General Cytology of the Uredineae by Vernon H. Blackman, printed in the Annals of Botany, Vol. XVIII, July 1904, is a very important contribution, but space is wanting for even a meager outline of the paper. A few sentences may be quoted: "The mature teleutospore is uninucleate and gives rise to four uninucleate sporidia, from which a mycelium is developed with the nuclei arranged singly, usually in separate cells. The spermatia produced on this mycelium are uninucleate, but in the young aecidium the nuclei become paired (forming binucleate cells) and divide together in very close association. This paired condition is then persistent throughout the rest of the life-cycle (aecidiospores, uredospores, and mycelia produced from them) up to the formation of the teleutospores, which in the young state are binucleate, but when mature become uninucleate by the fusion of the two paired nuclei. . . . A study of the structure of the spermatia of the Uredineae shows that they have the characters not of conidia but of *male cells.* . . . The fusion in the teleutospores of the two nuclei — the direct descendants of those which first became associated in the *fertile* (*female*) cell of the aecidium — is clearly not in itself a process of fertilization (nor the teleutospore an egg-cell), as Dangeard and Sapin-Trouffy supposed, but a mere secondary process, the result of fertilization and the preliminary to reduction."

THERE IS AN EXCELLENT THOUGH BRIEF REVIEW BY H. HASSELBRING in the December No. of the Botanical Gazette (1904), of Hollos' imposing monograph of the Gasteromycetes of Hungary, German edition. We quote: "The complete descriptions, full of synonomy and citation, and the excellent illustrations are three features that will insure this book a position of authority among taxonomic works. Not only will it be of value to the students of the country for which it was written, but also to American students, for most of the gasteromycetes have a world-wide distribution. Of the forms described nearly all occur in this country and specimens of many of these were seen and cited by the author."

THE DISCOMYCETES OF EASTERN IOWA BY FRED J. SEAVERS is a paper of 67 pages and 25 plates issued in Nov. 1904, in the Bulletin of Laboratories of Natural History of the State of Iowa (Vol. V, No. 4). Mr. Seaver gives a general account of the Group, reproduces in English, from the Pflanzen-familien, the complete key to the genera of Helvellineae and Pezizineae, describes all the Iowa species with their bibliography, and furnishes admirable figures. He states that since the determinations have been made for the most part without material for comparison, any corrections by those interested will be gratefully received.

MR. E. BARTHOLOMEW has recently sent out the XX CENTURY OF ELLIS AND EVERHART'S FUNGI COLUMBIANI (NOV. 15, 1904). A wide range in the groups of fungi and in the territory covered is represented by the specimens. The genus Puccinia is especially well represented — there being 27 specimens. With one specimen the description is furnished, namely, Aecidium batesianum Barth. n. sp. The usual data are printed on the labels, as host, locality, collector, also citation for the original publication.

NOTES ON THE VARIABILITY OF HYPOTHELE REPANDA, an article of four and a half pages, by Howard J. Banker, is published in the August number of Torreya (1904). The gist is contained in his "synopsis" which is as follows:

Plant reddish buff.

Plant small, less than 4 cm. wide, often umbilicate; spores large, 8-10μ wide. Form *a.*

Plant large, stout, reaching 12 cm. wide, average width of cap 6-8 cm.: pileus often cracked, sometimes into thick scales, deeply umbilicate; spores 7-8μ wide. Form *b.*

Plant pale buff to cream color, slender, medium size, average 4-6 cm. wide, rarely 7 cm.: spores 7-8μ wide. Form *g.*

THE JOURNAL OF MYCOLOGY, Vol. 11, No. 75 (Jan. 1905) contained the following: Morgan, Spaheria Calva Tode; Seaver, A New Species of Sphaerosoma; Arthur, Sydow's Monographia Uredinearum, With Notes Upon American Species; Memminger, Agaricus Amygdalinus M. A. C.; Kellerman & Ricker, New

Genera of Fungi Published since 1900; Kellerman, Uredineous Infection Experiments in 1904, Elementary Mycology—Continued, Ohio Fungi Fascicle X, Notes From Mycological Literature X; Editor's Notes.

The Articles in the Journal of Mycology, Vol. 11, No. 76 (March, 1905) were as follows: Morgan, The Genus Gibellula Cavara; Arthur, Cultures of Uredineae in 1904; Kellerman & Ricker, New Genera of Fungi Published since 1900; Kellerman, Notes from Mycological Literature XIV; Editor's Notes.

M. Leon Rolland Gives Some Observations sur quelques especes critiques in the Revue Mycologique, October, 1904. The species commented on are *Lactarius porninsis, Stropharia coprinifacies, Laccaria laccata* forme *retinispora* Roll. n. f. and *Boletus plorans.*

William A. Murrill Gives the Ninth Installment of His Polyporaceae of North America in the Bulletin of the Torrey Botanical Club, November, 1904. The genera enumerated are Ionotus, 11 species; Sesia, 4 species; Ischnoderma, Laetoporus, Trichaptum, and Pogonomyces,—each one species; the last three are proposed as new genera. The new species are Inonotus texanus, I. jamaicensis, I. corrosus, I. wilsonii, I. pusillus, I. amplectans. Keys, notes and full synonym are given as in the previous Parts. The Inonotus pusillus is only 2 x 2 x 0.5-1 mm. in size, one of the very smallest of Polyporaceae. The author says besides: Two other tiny plants are of interest in this connection, *Prodiscus pendulus,* which is also erumpent from lenticels, but has hyaline spores; and *Coltriciella dependens,* which is more like the present species in general appearance and structure, but is stipitate instead of sessile, having the stipe attached to the vertex of the pileus like the handle of a tiny bell.

Geotropism of Polyporus, Plant World, September, 1904, p. 224, is a note by C. E. Waters, referring to growth as semi-inverted bracket-fungi resulting from changed position by falling of old tree trunk.

Notes on the Japanese Fungi, II. Some Species of Uredineae, by S. Kusano, the Botanical Magazine, November 20, 1904, refers to Puccinia cacaliae Kusano n. sp., P. benkei Kusano n. sp., P. diplachnis Arthur on Diplachne serotinae chinensis, and Phragmidium rubi-thunbergii Kusano n. sp. Outline figures of spores are given for the new species.

Bruce Fink Gives Further Notes on Cladonias, IV. Cladonia verticillata in the November (1904) Bryologist. Descriptions and notes on distribution, etc., are given of this and its varieties *evoluta, cervicornis,* and *abbreviata,* also a plate of three figures made from photographs.

JOURNAL OF MYCOLOGY

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EDITOR'S NOTES.

It is very gratifying that I am able to present the likeness of so well known and honored pioneer mycologist as Dr. M. C. Cooke, whose genial countenance graces the frontispiece page of this number of the Journal.

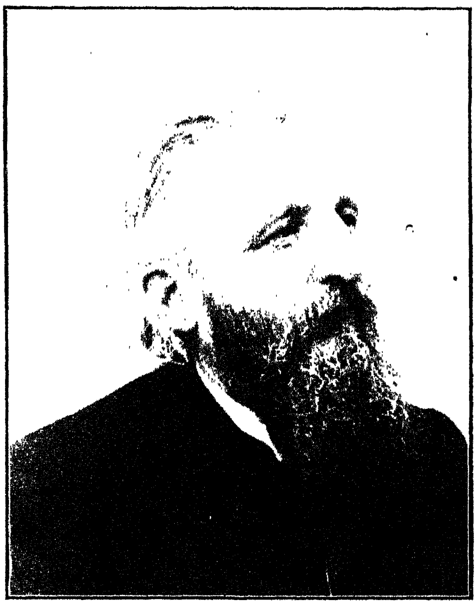
It was in 1872, that Dr. Cooke began Grevillea, a journal that was carried through twenty volumes, but unfortunately discontinued in recent years. When the first volume was finished, he said: "The completion of the first volume of an English Journal specially devoted to Cryptogamic Botany, enables us to congratulate our readers and ourselves upon the achievement of a task that many friends believed to be impossible." To Grevillea we owe much both for the beginning and rapid development of modern mycology. Dr. Cooke can well facilitate himself on the gratitude all living mycologists harbor for his fruitful labors!

This occasion may be taken advantage of to return thanks to the European mycologists who have so kindly responded to requests for photographs for use in making the Journal of Mycology portraits and facsimile autographs.

Those who publish a "Journal" and have other work to do besides, will commiserate with me — and they if not others, will grant me indulgence for not being on time with my Numbers. It can be guaranteed that the *intention* is all right — and perhaps soon I can catch up and have the Journal out on time.

Again an installment is given of the Index to North American Mycology — though this even does not bring everything up to date; it is hoped that working mycologists will reap some benefit from this part of the program which the Journal has laid out for accomplishment. The *separate* of this installment makes the Eighth Part reprinted on one side of the page for card index purposes. It may not be amiss to state again that a separate subscription list and mailing list pertains to this series of reprints — each part costing the subscriber 25 cents.

Journal of Mycology, Vol. 11, pp. 105-152, Issued July 19, 1905.



P. A. Saccardo

Journal of Mycology Portraits with Facsimile Autographs.

Journal of Mycology

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A NEW SPECIES OF KALMUSIA.

A. P. MORGAN.

KALMUSIA ASPERA MORGAN SP. NOV.—Stroma eutypoid, extensively and indefinitely effused, the surface roughened by the prominent ostiola, immersed in the wood and transforming and blackening its substance superficially, but underneath coloring it yellow to a considerable depth. Perithecia rather large, depressed-globose, black, monostichous, sunk to the neck, closely crowded and confluent; the necks rather short, rude, subcylindric, the ostiola entire. Asci cylindric, with a short stalk, 150-180 x 8-10 mic., 8-sporous, the spores uniseriate, paraphyses ———? Spores elliptic-oblong inaequilateral or slightly curved, 3-septate, the two middle cells much larger and becoming brown, the terminal cells small and remaining hyaline, the entire spore 17-21 x 7-9 mic.

Growing on the hard wood of a prostrate trunk of Gleditschia; Preston, O., Dec. 5, 1904. The stroma blackening and roughing the trunk extensively after the manner of some species of Eutypa; the perithecia .7-1.0 mm. in diameter, the necks short and slender but variable in length. The specimen is very ripe and although there were asci, I could not detect any paraphyses and so presume they had disappeared.

PEZIZA PUBIDA B. & C.

A. P. MORGAN.

From the Linnean Society's Journal, Vol. XXXI, page 492, I extract the following reference:

PEZIZA (§ Sarcoscypha) SEMITOSTA, B. & C., *Macropodia semitosta.* Sacc., Peziza pubida, B. & C., Macropodia pubida, Sacc., Exsiccati, Ellis & Everhart, N. American Fungi No. 2740, Ellis N. American Fungi No. 1269, Rab.-Winter Fung. Eur. No. 3275.

The spores of this species are described as "smooth, often guttulate, elliptical, ends narrowed, 28-32 x 12 mic."

Fred Jay Seaver, in the Discomycetes of Eastern Iowa, describes the spores of Macropodia pubida (B. & C.) Sacc. as "fusiform, rough, 38-42 x 10." In An Annotated List of Iowa Discomycetes Mr. Seaver states that Peziza Morgani Massee is identical with Peziza pubida B. & C. of Ellis's N. A. Fungi No. 1269. He states further that the specimen in Rabenhorst-Winter Fungi Europæi No. 3275 is different; he says it contains "spores which are elliptical, rough and only 15 x 8 mic."

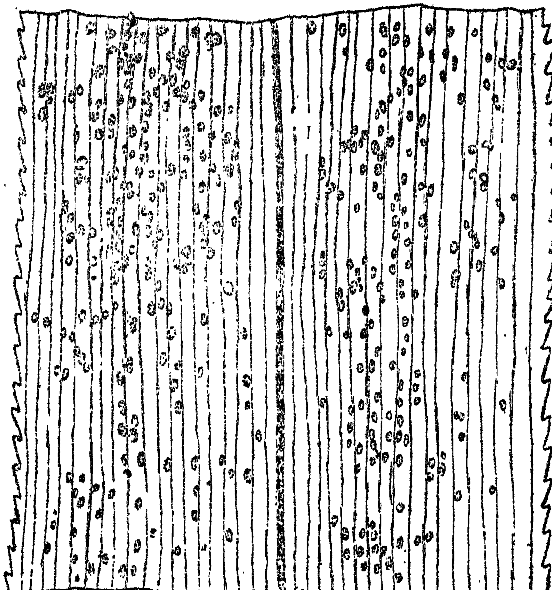
There is always surmise as to the amount of "straddle" each expert may allow to spore-measurements. It is also constantly occurring that two or more species are mixed in the same numbers of the various exsiccati.

At any rate it would appear that the numbers of Peziza pubida B. & C. in the collections at Kew are quite different from the corresponding numbers in the collections of the gentleman in Iowa.

A NEW SPECIES OF SYNCHYTRIUM.

J. J. DAVIS.

While examining leaves of *Scirpus atrovirens* Mühl. with a hand lens I was surprised to observe the presence in some of the leaves of a *Synchytrium.* The host plants were on the border of a button bush swamp in Kenosha county, Wisconsin, and further search revealed the presence of the parasite in one or two similar situations in the vicinity. It produces little distortion of the host and it requires a sharper eye than mine to see it without a magnifier. Attempts to secure the germination of the resting spores have not succeeded beyond the conversion of the spore contents into globular bodies about 20 μ in diameter — presumably zoosporangia.



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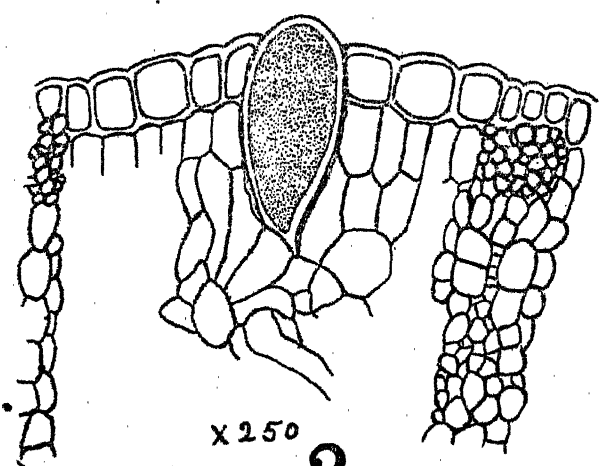

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SYNCHYTRIUM SCIRPI DAVIS.

Fig. 1, surface of leaf of Scirpus atrovirens attacked by the parasite.
Fig. 2, section of leaf and spore.

Material has been gathered and prepared for distribution in *Fungi Columbiani* preparatory to which it would seem desirable to give the species a name. It may be characterized as follows:

SYNCHYTRIUM SCIRPI Davis n. sp., subg. Pycnochytrium.—Spots minute, reddish brown. Distortion of the host slight, the "galls" seldom projecting more than 50 μ from the surface of the leaf. Resting spores amphigenous, scattered or aggregated, produced singly in the epidermal cells, globose, ovoid, elliptical, cuboidal or brick shaped, 60-110 x 50-75 μ in diameter. Epispore dark brown; endospore lighter brown, 3-5 μ thick. Spore contents coarsely granular, staining black with osmid acid.

On leaves of *Scirpus atrovirens* Mühl., Kenosha county, Wisconsin, August and September.

Racine, Wisconsin, August 1905.

NORTH AMERICAN SALVIA-RUSTS.

E. W. D. HOLWAY.

PUCCINIA VERTI-SEPTA Tracy & Gal. Jour. Mycol. 4:21, 1888. Diorchidium Tracyi DeToni. Sacc. Syl. 7:736, 1888. Jour. Mycol. 5:95, 1889.

O. Spermogonia few, in the center of the clusters of aecidia, epiphyllous, about 80 μ in diameter.

I. Aecidia epiphyllous, on yellow spots 1-2 mm. in diameter, surrounding the spermagonia mostly 8-10 on the spot, minute, 160-240 μ in diameter, low, peridia split into irregular segments; aecidiospores very irregular in shape and size, globose, ovate, angular, elliptical, or with one or both ends acute, and with the exception of the globose ones, with both ends thickened up to 8 μ, tuberculate, pale brown, 28-40 x 18-26 μ; germ-pores numerous, minute.

III. Teleutosori black, amphigenous, pulverulent, punctiform, sometimes occurring only on the margin of the underside of the leaves, causing a discoloration about 5 mm. in width all the way around; teleutospores globose, tuberculate, septa all vertical, apex mostly with a broad cap about 4 μ thick, 28-36 x 24-38 μ; pedicel hyaline, fragile, up to 75 μ long.

On Salvia Sessei Benth. Cuernavaca, Mex. Sept. 26, 1898, No. 3012 (type for the aecidium); Sept. 30, 1899, No. 3539. On Salvia ballotaeflora Benth. New Mex. (type for III.). No uredospores could be found, although search was made for them each year. If the teleutospores are treated with caustic they swell so as to measure 36-44 x 36 μ, and the caps become very distinct. The germ-pores of the teleutospores are not all at or near the

poles, but both are sometimes at the base near the pedicel, sometimes at the apex, and occasional one at the base and one at the apex. The tubercles are deciduous, and a slight movement of the cover glass is sufficient to break them all off of the aecidiospores, leaving them minutely roughed. They are found in this condition in old sori; so, too, are the teleutospores.

The type specimen was found in the Herb. of the U. S. Department of Agriculture and was divided between the Herb. and Mr. Tracy. The Washington specimen seems to have disappeared from the collection. I am indebted to Dr. Trelease for an opportunity to examine the Tracy specimen. It is a fragment of a leaf with a few sori, but there was one aecidium with a portion of the peridium attached, and there is no doubt about the uredospores described by the authors of the species being aecidiospores. Those seen measured 24-28 x 26-38 μ, and possessed the same numerous minute germ-pores found in the Mexican specimens; the tubercles had dropped off, leaving them "slightly roughened," as described by the authors for their uredo. The teleutospores could not be examined thoroughly as the type was so small, but the three examined did not differ in any way from the Mexican specimens. The walls of the teleutospores are 2-3 μ thick.

This is a typical Diorchidium of the D. Woodii type, but there does not seem to be sufficient reason for separating it from Puccinia.

PUCCINIA CAULICOLA Tracy & Gal. Jour. Mycol. 4: 20, 1888. Puccinia nigrescens Peck. Bot. Gaz. 3: 35, 1878. (Not P. nigrescens Kirchn. Lotus. 6: 132, 1856.) Puccinia Salviae lanceolatae Bubak. Sydow, Monogr. Ured. 1: 294, 1902. Aecidium caulicolum Kellerm. Jour. Mycol. 9: 227, 1903.

Mexico; On Salvia lanceolata Willd. Pachuca, Oct. 5, 1899, No. 3583; near Tula. Sept. 20, 1898, No. 3201; U. S., in New Mex., Kans., and S. Dak.

This species occurs on Salvia lanceolata only, so far as known. The specimens on Salvia Pitcheri Torr (S. azurea grandiflora Benth.) which have been referred here are Puccinia farinacea Long.

PUCCINIA MITRATA SYD. Monogr. Ured. 1: 294, 1902.

Mexico; On Salvia sessilifolia Gray, Guadalajara, Oct. 13, 1896; S. polystachya Ort. Uruapam, Oct. 12, 1899, No. 3620; Amecameca, Oct. 31, 1899, No. 3766; Patzcuaro, Oct. 16, 1898, No. 3009; S. tiliaefolia Vahl, Guadalajara, Sept. 16, 1899, No. 3434; S. fluviatilia Fernald, Cuernavaca, Sept. 27, 1898, No. 3028; S. vitifolia Benth. Oaxaca, Oct. 21, 1899, No. 3709; S. purpurea Cav. Chapala, Sept. 25, 1899, No. 3500; Etzatlan, Jalisco, Oct. 2, 1903, No. 5089; Oaxaca, Oct. 18, 1899, No. 3674; S. amarissima Ort. Pachuca, Oct. 5, 1899, No. 3574; Morelia,

Oct. 8, 1899, No. 3590; S. mexicana L. City of Mex., Oct. 2, 1896; S. hyptoides Mart. & Gal. Oaxaca, Oct. 11, 1894, C. G. Pringle; Salvia sp. Oaxaca, Oct. 18, 1899, No. 3666.

The most common Salvia rust in Mexico.

PUCCINIA INFREQUENS Holway n. sp. — Sori hypophyllous, light brown, minute, scattered.

II. Uredospores light brown, globose, echinulate, 20-24 μ in diameter.

III. Teleutospores light brown, elliptical to oblong, rarely globose, tuberculate, cells rounded at both ends, apex mostly with a broad cap, wall 2-3 μ thick, pedicel hyaline, fragile, about the length of the spore.

On Salvia cinnabarina Mart. & Gal. Oaxaca, Mex. Oct. 18, 1899, No. 3669.

PUCCINIA BADIA Holway n. sp. — Sori amphigenous, punctiform, scattered.

II. Uredosori brown; uredospores light brown, echinulate, wall thin, globose, ovate, or angular, 18-24 μ, mostly 20 μ in diameter, often thinner and lighter colored on one side.

III. Teleutosori black; teleutospores dark chestnut-brown, almost opaque, coarsely tuberculate, 32-36 x 28-32 μ, wall about 4 μ thick, apex rarely with a slight cap, pedical persistent, hyaline, up to 50 μ long, often inserted laterally or in line with the septum.

Mexico; On Salvia albicans, Fernald, Iguala, Nov. 4, 1903, No. 5332 (type); Sept. 3, 1900; S. chrysantha Mart. & Gal. Oaxaca, Oct. 21, 1899, No. 3698; On Salvia sp. Sayula, Jalisco, Oct. 8, 1903, No. 5131; Tehuacan, Pueblo, Nov. 8, 1903, No. 5334.

PUCCINIA GRISEOLA Lagerh. Sydow. Mongr. Ured. 1:296, 1902. Amecameca, Mex. Oct. 20, 1903, No. 5200. On Salvia elegans Vahl.

PUCCINIA NIVEA Holway n. sp. — Spots dark brown with a yellow or purple border; sori hypophyllous, light brown, small, compact, 4-12 on a spot, sometimes confluent and elongated along the veins of the leaf.

III. Teleutospores germinating at once, hyaline, or subhyaline with granular contents, smooth, constricted at the septum, the upper corner of the lower cell projecting, upper cell mostly larger and rounded, the lower narrowed to the pedicel, which varies from short to the length of the spore, wall of the upper cell about 4 μ thick, that of the lower thinner, apex not at all thickened or up to 12 μ thick, 40-80 x 16-28 μ.

On Salvia purpurea Cav. Oaxaca, Mex. Oct. 21, 1899, No. 3696; Nov. 11, 1893, No. 5378.

Minneapolis, Minn., Dec. 27, 1904.

NOTES ON SOME NORTH AMERICAN PHYLLACHORAS.

JOSEPH F. CLEVENGER.

During the past year I have critically examined a large number of specimens of several of the species of Phyllachora. At the suggestion of the Editor of the JOURNAL, I present here some of the more interesting notes made. The material used, most of it previously identified, belongs to the herbarium of the Ohio State University and to Professor Kellerman's private herbarium. All these and some additional specimens furnished by several botanists were kindly placed at my disposal. Much of the material apparently in good condition proved to be sterile or immature and consequently not so much was accomplished in the study of the genus as was anticipated in the beginning.

The genus Phyllachora belongs to the large family Dothideaceae, a group of the higher fungi. There are according to Lindau in Pflanzenfamilien 200 species of Phyllachora reported from the world, of which forty-four have been reported from North America and islands adjacent. Of these forty-four I have been able to examine material representing twenty-two species, though not all in condition favorable for most satisfactory study.

Plate 78 illunstrates in a general way the different types which have been described as Phyllachora, none of which seem to have been figured with the possible exception of Figs. 14-16.

It is to be noted that some species which have been described as Phyllachora have only conidiospores, as is illustrated by Fig. 13. Some show asci with only four ascospores, as is illustrated by Fig. 19. Others show asci with sixteen ascospores, see Fig. 30. In a few cases not heretofore reported I have found asci and ascospores.

This is only a preliminary report on the species of Phyllachora and it is intended to carry the work on in the future. Specimens, either determined or undetermined, are kindly solicited and may be sent to the Botanical Department of the Ohio State University, Columbus, Ohio.

The material examined was of course on dry leaves and stems of various plants and was prepared for examination by two methods, namely, imbedding in paraffine, and free hand sections. The imbedding was unlike the ordinary in that the material was softened in warm water from one to three hours and then left in a 10 per cent. solution of hydrofluoric acid from two to four days, treated with agar-agar, and finally imbedded in paraffine. The sections were stained on the slides in the ordinary way. The iron-alum haematoxylin stain gave the best results for general study. This method was most satisfactory in the study of the

perithecia and of the structure of the stroma. In the study of the asci and ascospores the best results were obtained by selecting a mature stroma, teasing it apart on the slide and staining it with eosin.

NOTES ON SPECIES.

PHYLLACHORA TRIFOLII (Pers.) Fckl. Fig. 1-4.—This is found on several species of Trifolium. On Trifolium wormskioldii collected by E. B. Copeland at Montana Pt., California, were found mature asci and ascospores. The asci are cylindrical, 8-spores, (Fig. 3), ascospores uniseriate, oval, hyaline, 8-10 x 5-6 μ (Fig. 4).

Cooke, Grev. XIII: 63, states that the spores are 20 x 10 μ. Persoon, Synoposis, 30, did not report finding asci or ascospores. Neither did Fuckel in Symbolae Mycologicae report any asci or ascospores.

Further investigation may verify the great difference which seems to occur in the above descriptions. Since the descriptions coincide in the main, I believe the plants referred to are one and the same thing.

PHYLLACHORA AMBROSIAE (B. & C.) Sacc. Fig. 5-10.—This is found on several species of Ambrosia but generally immature or sterile. On Ambrosia psilostachya, collected by W. A. Kellerman at Manhattan, Kansas, Aug. 1889, asci were found containing eight ascospores. Ascospores uniseriate, elliptical, hyaline, 17 x 9 μ.

Cooke, in Grev. 4: 105, on Ambrosia artemisifolia and Ambrosia elatior, reports practically the same thing, only he says nothing about the number of ascospores in an ascus nor the size of the ascospores.

PHYLLACHORA DIPLOCARPA E. & E. Fig. 11-13.—This was named and described by J. B. Ellis and B. M. Everhart. At first they called it Homostegia diplocarpa, later because of the character of the stroma they changed it to Phyllachora diplocarpa, Bull. Torr. Bot. Club, 24: 135 and 292, 1897. They described it from material (on Distichlis maritima) collected by E. Bartholomew in Rooks Co., Kansas, Sept., 1895. They report finding two kinds of conidiospores, suballantoid, hyaline, 5-7 x 1-1½ μ; cylindrical nucleated spores, becoming 3-septate, 14-23 x 4-4½ μ.

In the same material sent to me by E. Bartholomew only the cylindrical 3-septate conidiospores were found.

This is one of the species of Phyllachora in which only conidiospores have been found.

PHYLLACHORA GRAMINIS (Pers.) Fckl. Fig. 14-16.—The speciment in question was found on Bouteloua oligostachya which was collected by E. Bartholomew at Stockton, Kansas, Oct. 1892.

It corresponds quite well with Fuckel's description in Symbolae Mycologicae, 219, except that the ascospores are larger. This does not seem to be sufficient reason for putting it anywhere else; Winter, in Die Pilze, gives the limitations such that it will include this. It has been found that different grasses show quite a variation in the character of the stroma and the size of the ascospores.

This species is one of the most common ones and is quite generally figured.

PHYLLACHORA LESPEDEZA (Schw.) Sacc. Fig. 17-19. — This is found occurring on different species of Lespedeza, although frequently immature. On Lespedeza repens, collected by W. A. Kellerman on the Gauley Mountains, W. Va., and Lespedeza capitata, collected by same at Manhattan, Kansas, were found mature asci and ascospores. The asci were clavate to cylindrical and *4-spored*. Ascospores ellipical, uniseriate to biseriate, hyaline, 12 x 7 μ.

Cooke, in Grev. 13:63, 1884, reports "ascis clavitit, sporidiis, ellipticis, continuis, hyalinis, .02 x .01 mm." Nowhere have I found any statement as to the number of ascospores in an ascus. The character of the stroma would place it in the genus Phyllachora.

The only difference in the stroma on the two host-species were: on Lespedeza capitata they were in circular patches; while those on Lespedeza repens were scattered over the leaf.

PHYLLACHORA CORNUOSPORA Atk. Fig. 21-24. — This species was named and described by Geo. F. Atkinson, Bull. Cornell Univ. 3:1897. He kindly sent some of the material to me and I found that it corresponded with his description, but I also found (which he does not mention) paraphyses present. This is included here because it shows a curved appendage at the large end of the ascospore representing a peculiarity which is not common. Besides, this species has not been figured before.

PHYLLACHORA JUNCI (Fr.) Fckl. Fig. 26-31. — This is found on Juncus effusa quite frequently, but is usually immature or sterile. Fuckel, Syhbolae Mycologicae, 216, states "sporidiis oblique monostichis, simplicibus, ovatis, biguttulatis, hyalinis, 12 mik. long., 6 mik. crass." Dr. Winter, Die Pilze, 900, gives "sporen schräg 1- oder 1-1½ reihig, oblong, mit undeutlichen septum (?) gelblich- oder grundlich-hyalin, 9-10 μ lang, 3—5.5 μ dick." Ellis and Everhart, North American Pyrenomycetes, 600, state the same thing as is found in Die Pilze. This was originally described as a Sphaeria by E. M. Fries in Systema Mycologicum, 2:428, as a Dothidea in Summa, 387. On Juncus effusa, collected by W. G. Farlow at Campbella, N. B., July, 1902, the general conditions in the material examined were found to be the same, while some of the details were very different. In only one instance did I find the specimen in good condition for study. Fig. 27 shows an

immature ascus with eight spores as ordinarily seen. Fig. 28 shows a spore in which a constriction is beginning to form, and Fig. 29 shows the spore after it has divided and formed two spores. Fig 30 shows a mature ascus with *sixteen ascospores.* In no other species of Phyllachora did I find *more than eight spores* in an ascus. The sixteen ascospores seem to place it in another genus, but the character of the stroma would make it a Phyllachora. Material which had been collected in Ohio was either sterile or immature.

EXPLANATION OF PLATE 79.

A Leitz microscope with oculars 18 and 6 and objectives 7 and 3 were used in making the magnified drawings. The plate was made from the original drawings and reduced 2½ diameters.

For Figs. 4, 9, 13, 16, 19, 22, 23, 27, 28, 30 and 31 a No. 18 ocular and No. 7 objective were used, giving a magnification of 500 diameters.

For Figs. 3, 8, and 14 a No. 6 ocular and No. 3 objective were used, giving a magnification of 166 Diameters.

For Figs. 2, 7, 12, 17, 21, and 26 a No. 6 ocular and No. 3 objective were used, giving a magnification of 27 diameters.

Figs. 1, 5, 6, 11, 17, 20, and 25 showing hosts, are natural size unless otherwise indicated.

1–4. Phyllachora trifolii (Pers.) Fckl. on Trifolium wormskioldii.
1. Host plant natural size.
2. Cross section of leaf showing perithecia.
3. Ascus.
4. Ascospore.

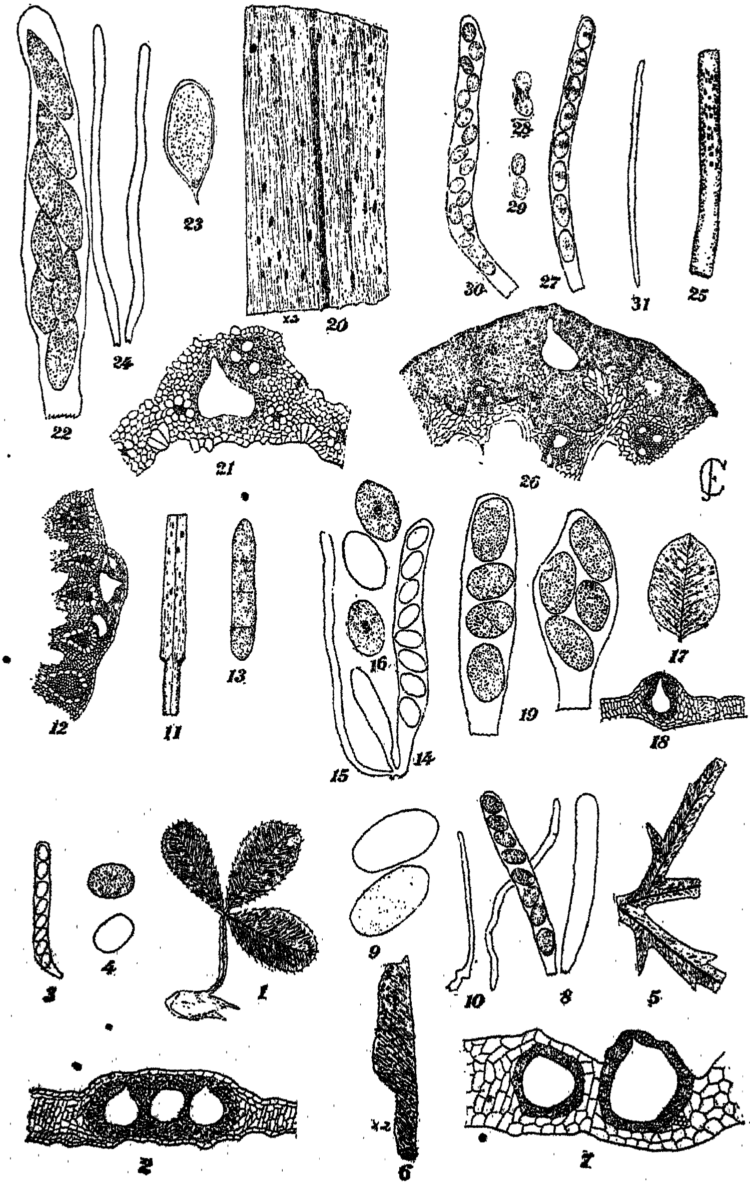
Figs. 5–10. Phyllachora ambrosia (B. & C.) Sacc. on Ambrosia psilostachya.
5. Host plant natural size.
6. A piece of leaf magnified two diameters showing stroma.
7. Cross section of leaf showing perithecia.
8. Asci.
9. Ascospore.
10. Paraphyses.

Figs. 11–13. Phyllachora diplocarpa E. & E. on Distichlis spicata.
11. Host plant natural size showing stroma on surface of leaf.
12. Cross section of leaf showing perithecia.
13. Conidiospore.

Figs. 14–16. Phyllachora graminis ? (Pers.) Fckl. on Bouteloua oligostachya showing how asci and paraphyses are fascicled (14–15).
14. A mature and an immature ascus.
15. Paraphysis.
16. Ascospores.

Figs. 17–19. Phyllachora lespedezae (Schw.) Sacc. on Lespedeza repens.
17. Leaf of host showing the stromata.
18. Cross section of leaf showing perithecium.
19. Asci containing ascospores.

Figs. 20–24. Phyllachora cornuospora Atk. on Panicum agrostoides.
20. Host plant magnified two diameters showing stroma.
21. Cross section of leaf showing perithecia.
22. Ascus containing ascospores.
23. Mature ascospores.
24. Paraphyses.



ILLUSTRATIONS OF SOME PHYLLACHORAS

Figs. 25–31. Phyllachora junci (Fr.) Fuckel on Juncus effusa.
25. Host showing the stroma.
26. Cross section of stem of host showing perithecia.
27. Ascus showing ascospores before the last division in the spores.
28. Ascospores in process of dividing.
29. Ascospores after final division.
30. Ascus with sixteen ascospores.
31. Paraphysis.

BLACKSPOT CANKER AND BLACKSPOT APPLE ROT.

W. H. LAWRENCE.

Macrophoma curvispora Peck; Torry Bot. Club, Vol. 27, 21 Ja. 1900. Gloeosporium malicorticis Cordley; Bot. Gaz. Vol. 30, No. 1, p. 57, Jl. 1900. Myxosporium curvisporum (Peck) Sacc. in litt.

Blackspot Canker[1] fungus like bitter rot fungus causes a disease of both the tree and fruit. It differs from bitter rot, however, in that the canker stage does by far the greater amount of damage. This stage during the past few years has become very prevalent in the Maple Ridge and Mission districts of British Columbia and in Western Oregon and Western Washington in localities where the rainfall is considerable during the latter part of autumn and early winter.

In January, 1903, numerous decaying apples were found among stored fruit. A few pustules were present in some of the decaying areas. Later the epidermis overlying each pustule splits open exposing a central mass of creamy white spores. These spores were typical of the Blackspot Canker fungus except they were a little larger. Inoculations were made to determine the relation of the canker and rot. The fungus grown from decaying apples was placed in apple twigs with positive results. Spores taken from pustules in cankers placed on uninjured epidermis of the fruit also gave positive results in most cases.

The first indication of the presence of the fungus is a slight discoloration of the flesh of the apple just beneath the epidermis. The flesh becomes a light brown color and this is marked enough to be seen by the naked eye. As more flesh becomes involved the color becomes deeper brown. The epidermis makes a corresponding change in color. Decaying spots become depressed, dry and leathery. Pustules soon begin to make their appearance at the point of infection. The pustules are usually arranged in concentric circles about the point of infection — the more rapidly the

[1] Blackspot or Apple Canker; C. V. Piper, Ranch & Range, 8 Mr. 1900. Apple tree Anthracnos; A. B. Cordley, Bull. 60 Oregon Agr. Exp. Sta. Ja. 1900 and Bot. Gaz. Vol. 30, No. 1, p. 57, Jl. 1900. Blackspot Canker; W. H. Lawrence, Bull. 66 Wash. Agr. Exp. Sta. 1904.

rot develops the more regular are the rings of pustules. In many cases the decaying areas are found near the basin and cup ends of the apple along with apple scab fungus, in codling moth burrows, and in bruised places but over 50 per cent. of the cases observed show that the fungus enters directly through the epidermis of the fruit.

Moisture and temperature exert a marked influence on the development of the rot. In cool, dry weather the spots increase in size, but few pustules are developed. During cool, damp weather an abundance of pustules were found. There is also a tendency for varieties of fruit to decay more rapidly than others.

Examination of the fungus in numerous collections of infested bark gave forms that did not fully agree with the descriptions by Cordley and Peck. The description of the fungus as observed in these investigations is as follows:

Parasitic in the bark and sapwood of the trunk and the branches and on the stored fruit of the cultivated apple.

In the Bark. — Infested areas depressed, dark brown to blackish, oblong in outline one-fourth to six inches in length or longer; sometimes merging together when fully grown, free from the sapwood and bounded by a ragged fissure; acervuli (pustules) abundant, irregularly but quite equally distributed; round to oblong 200-900 mmm. in length, averaging 400-700 mmm., rupturing the epidermis, exposing a creamy white mass, later becoming black; pycnidia absent ; stroma usually flattened rarely concave, bearing numerous simple or branched, septate conidiospores as long as, or longer than the conidia; conidia borne acropetally, non-septate, hyaline or rarely with a greenish tint, oblong, geniculate or usually curved 3.8-5 mmm. x 15-20 mmm.

On the Fruit. — Decaying spots light to dark brown, concave, dry and leathery; acervuli numerous, usually larger than those in bark, usually concentrically arranged; stroma as described above; conidiospores longer, usually much branched, conidia varying much in size and shape, as long as 30 mmm.

GOMPHIDIUS RHODOXANTHUS ONCE MORE.

D. R. SUMSTINE.

Agaricus rhodoxanthus Schweinitz, Syn. Car. p. 83. 1822.
Gomphus rhodoxanthus Schweinitz, Syn. N. A. F. p. 151. 1834.
Paxillus flavidus Berk. Decades N. A. F. 116.
Flammula rhodoxanthus Lloyd. Mycolog. Notes. Herbst, Fung. Flora Lehigh Valley.

Schweinitz changed the name from *A. rhodoxanthus* to *Gomphus rhodoxanthus* in his Synopsis in 1834. Fries in his

Epicrisis changed the generic name *Gomphus* to *Gomphidius*. This latter name has generally been used. *Paxillus flavidus* is no doubt a description of a very yellow form of the so-called *G. rhodoxanthus*. I have found many specimens that were yellow with no trace of red, especially so after they were dried. There seem to be no good reasons for placing this plant in the genus *Flammula* as has been done by Lloyd and Herbst.

The following are also considered as synonyms:
Clitocybe pelletieri Lev. Gill. Hymenomycetes, 1 : 170.
Paxillus paradoxus Cooke, Cke. Handbook.
Flammula paradoxa Kalch. Fung. Hung.
Flammula tammii Fr.

Among the woody polypores we have the genus *Lenzites*, in which we find species with lamelloid and poroid hymenial surfaces. *Lenzites betulina* almost invariably has gills and yet it is placed among the polypores.

The genus *Boletinus* stands in the same relation to the Boleti as *Lenzites* does to the Polypori. It is to be expected that we will find in the genus *Boletinus* forms that partake more of the lamelloid than of the poroid structure.

Having collected several hundred specimens during the last three years and having carefully noted the permanent character as well as the variations, I am forced to the conclusion that this plant does not belong to the agarics. The pileus always indicates a Boletus, and is covered with a tomentum closely resembling *Boletus subtomentosus* as has been suggested by Schweinitz. Veins connecting the gills are found in all specimens. These veins may be small or they may become transverse partitions forming large pores. Some of my specimens show both lamellae and pores. One specimen has true pores. Therefore considering the surface of the pileus and the variable character of the hymenium, which is both lamelloid and poroid, I suggest a new name for this plant, *Boletinus rhodoxanthus* (Schw.) Sumstine. Requiescat in pace.

Kittanning, Pa., Aug. 5, 1905.

THE HOST PLANTS OF PANÆOLUS EPIMYCES PECK.

HELEN SHERMAN.

Panæolus epimyces, first discovered and described by Peck,[1] has been found from time to time more or less abundantly in the vicinity of Madison, Wis. The same species has been reported near London, Ontario, from whence it was sent by Dearness[2] to the Lloyd Mycological Museum. Neither Peck nor Dearness mentioned the host plant of this fungus.

Peck's description is as follows: Pileus fleshy, at first subglobose, then convex, white, silky-fibrillose, flesh soft, white or whitish; lamellae rather broad, somewhat close, rounded behind, adnexed, dingy white becoming brown or blackish with a white edge; stem short tapering upward, strongly striate and minutely mealy or pruinose, solid in the young plant hollow in the mature plant but with the cavity small, hairy or substrigose at the base; spores elliptical black, .0003′-.00035′ long, .0002′-.00025′ broad. Plant 1′-1.5′ high, pileus 8″-12″ broad, stem 3″-4″ thick. Parasitic on fungi.
North Greenbush, November.

Specimens found in this region agree with this description quite closely. The only points of difference are that the pileus and spores are larger. The pileus is sometimes over 2 in. broad and the spores run up to .0004′ long by .00028′ broad.

McKenna,[3] in 1900, studied the material collected at Madison and identified the host of all the specimens found up to that time as Coprinus atramentarius (Bull.) Fr. His material was always found growing in close connection with uninfected clumps of C. atramentarius. Upon sectioning the thickened edges of the hypertrophied mass of the host, he found the gills and hymenium well developed. He also found mature spores which were identical with those of C. atramentarius. From one to seven of the parasitic fruit bodies were found on a single host.

In order to work out the relations of the hyphae of the host and parasite he fixed, imbedded and sectioned tissues from different parts of several specimens especially from the point where the stipe of the parasite arises from the tissues of the host. The hyphae of the parasite were found to be denser and smaller than those of the host. They branch profusely toward their ends and are swollen at the very tips. These hyphae for the most part

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[1] C. H. Peck. 35th Annual Report of New York Museum of Natural History. Report of Botanist, 1882, p. 133.

[2] Lloyd. 4th Report of Lloyd Mycological Museum for 1898. Catalogue of Specimens added during 1898, p. 5.

[3] F. H. McKenna. Some Fungous Parasites of the Fungi. Thesis, Univ. of Wis., 1900, MSS., p. 18.

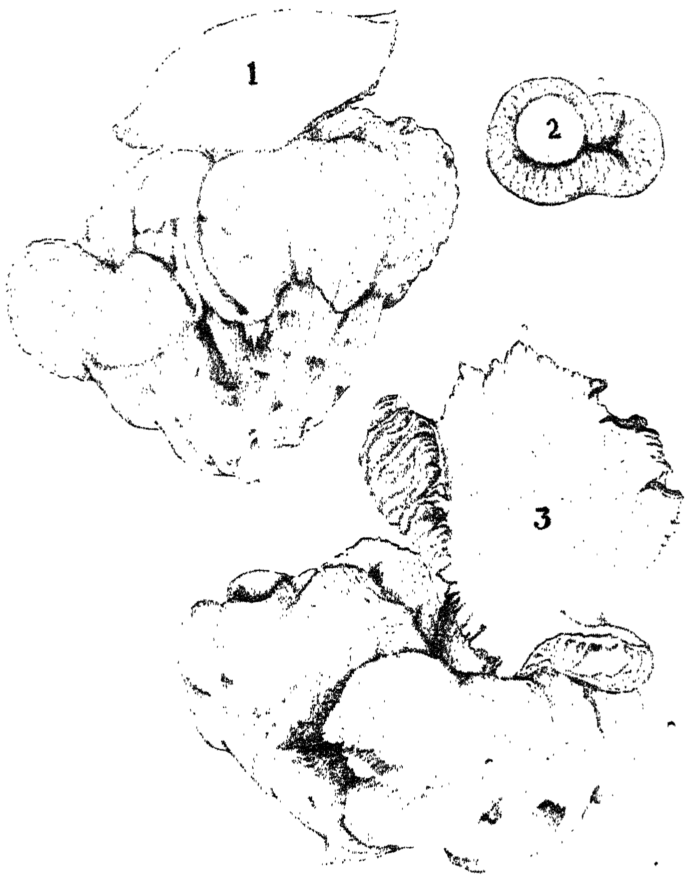
spread abundantly through the tissues of the host. However, they are not found deep down in the host tissues immediately below the point from which the stipe of the parasite arises. Nor do more than a few scattered hyphae appear in the peripheral regions of the swollen edges of the hypertrophied host. Occasionally he found the hyphae of the host swollen greatly, but in no case were their walls penetrated by the hyphae of the parasite.

On October 6, 1904, four very perfect and well developed specimens of Paneolus epimyces were found on a shady lawn apparently parasitic on Coprinus comatus Fr. Several large healthy specimens of the latter were found not more than 5 in. distant from any one of the infected forms and no other Agaric was or has since been found growing in that ivicinity.

These specimens resembled the herbarium specimens of those parasitic on C. atramentarius (as identified by McKenna), but with some variations. They are considerably larger, but the greater size is only proportional to the greater size of C. comatus as compared with C. atramentarius. The pileus in one specimen is 3.5′ broad. Here and there portions of the veil adhere to the pileus, forming a fringe on the young cap. The surface of the cap is roughened by reticulate umber colored areas, especially at the margin, which latter become elevated and flaky, breaking up into recurved umber patches. The stipe is cylindrical 1.5′ long by 5″ in diameter in the largest specimen. The spores vary in size from.0003′-.0004′ by .0002′-.00028′.

The hypertrophied host resembles that described by McKenna, but is larger, becoming from 2 to 3 inches in diameter by 2 inches high. It forms a cup-shaped or cushion-like mass with swollen edges and a deep indentation at the top. Sometimes a single large carpophore arises from the center of this indentation. In other cases two or more are present in various stages of development. The mass of the host is scarcely distinguishable as stipe and pileus. It is merely narrowed below and is connected directly with thick mycelial strands ramifying in the substratum. The outside is striate and covered with brownish fibres, especially that portion which corresponds to the pileus. The thickened edges of the hypertrophied host were examined, and although the gills, basidia and sterigmata could be distinctly made out, the fungus was apparently not sufficiently matured to produce spores.

The reasons for believing the host in this case to be Coprinus comatus are as follows: The fungi in question are accompanied by growths of C. comatus only, and the host resembles closely the form identified from its spores as C. atramentarius by McKenna, but is as much larger than that form as Coprinus comatus is larger than Coprinus atramentarius.



PANAEOLUS EPIMYCES PECK.

So called abortive forms very similar to these parasitized Coprini have been described for Clitopilus prunulus Scop, Clitopilus abortivius B. & C. and Armillaria mellea Vahl, but the cause of these formations is still unexplained. Clitopilus prunulus[1] produces aborted forms singly or in tufts. They are very variable in shape and are white tinged with brown on ruptured surfaces.

Peck[2] in describing the aborted forms of Clitopilus abortivus B. & C. says they are irregular or sub-globose fleshy whitish masses occurring in company with normal forms and apparently under the same conditions of soil, moisture and temperature. These forms are common here and are found in various stages of development. Some show marked characteristics of the normal form of C. abortivus while others are hypertrophied and contorted into masses resembling closely the forms described above for the Coprini. They are smaller, however, the largest not being over 1-1½ in. in diameter. The gills show plainly on sectioning.

The abortive forms of Armillaria mellea Vahl are also common in this region and are very similar to those of the two Clitopili just mentioned. Peck[3] states in his description of this form that the masses are of cellular matter without any distinction of stem, pileus or lamellae. "Without positive proof," McIlvaine[4] says, "no one would suspect either of these odd formations to be abortive of either Clitopilus abortivus or Armillaria mellea or any other fungus." In view of their resemblances to the parasitized Coprini described above, it is quite possible that these monstrosities are due also to the presence of some parasitic agaric which for some reason is unable to produce carpophores.

Explanation of Plate 80. — Panæolus epimyces Peck. Fig. 1 shows a well developed plant attached to its host. A later stage of the same is shown in Fig. 3, while a very young carpophore is illustrated in Fig. 2.

[1] McIlvane. One Thousand Am. Fungi, p. 256.
[2] Peck, C. H. 42d Report of N. Y. State Museum of Nat. Hist. for 1888. Report of Botanist, p. 138; see also McIlvane, One Thousand Am. Fungi, p. 257.
[3] Peck, C. H. 43d Report of N. Y. State Museum for 1889. Report of Bot., p. 89.
[4] McIlvane. One Thousand Am. Fungi, p. 56.

REVIEW OF:—JACZEWSKI, A. A., YEARBOOK OF INFORMATION CONCERNING DISEASES AND INJURIES OF CULTIVATED AND WILD ECONOMIC PLANTS. FIRST YEAR. 1903. pp. 166. ST. PETERSBURG, 1804. RUSSIAN.

ERNST A. BESSEY.

In this first number insect injuries are omitted; they are to be included in succeeding years. The diseases treated are described in such a way that a man of average intelligence will be able to identify most of them without the aid of even a hand lens. In the case of the more important diseases directions for combating them are given. The subject is arranged in nine chapters, according to the host plants, as follows: I, Cereals; II, Grasses and forage crops; III, Vegetables and garden plants; IV, Fruit trees; V, Berries; VI, Grapes; VII, Forest trees; VIII, Garden and ornamental plants; and IX, Tropical and subtropical plants. Four indexes close the work, viz, host and parasite indexes in both Russian and Latin.

I. CEREALS.

Wheat.—*Tilletia tritici* Wint., attacking especially winter wheat, and *Ustilago tritici* Jensen, principally on spring wheat were abundant over all Russia, especially, however, in the South-Central governments. Ergot, *Claviceps purpurea* Tul., was abundant in Kursk government. Of the three rusts, *Puccinia graminis* Pers., *P. glumarum* Eriks. & Henn., and *P. dispersa* Erik. & Henn. the second was rare, the third abundant, especially in the central governments, while the first was very abundant in these governments and especially in Caucasus where in some regions the crop was totally destroyed. Low-lying, shallow clay soils were most subject to the disease.

Rye. Ergot, *Claviceps purpurea* Tul., was a very serious pest, being very abundant in Western Siberia and in Central and Western Russia. In one district in Poland 33% of the grains were affected. Stem rust, *Puccinia graminis* Pers., was less abundant than usual, except in Kovno government where it was unusually severe. Brown rust, *P. dispersa* Eriks. & Henn. occurred more or less abundantly in Central and Western Russia.

Oats. *Ustilago avenae* Rostr., was not abundant in Northern Russia, but in the South was destructive, as well as in the East. In Simbirsk government the variety Datsky was especially severely attacked. *Puccinia graminis* Pers. and *P. conorifera* Klebh. although occurring, were nowhere very destructive.

Barley. *Ustilago hordei* Bref. was scarce in 1903 although in 1901 it was abundant in many districts. *Puccinia graminis*

Pers. and *P. simplex* Eriks. & Henn. occurred in North-western and Central Russia, but not destructively. Ergot, *Claviceps purpurea* Tul. was abundant in Kursk government.

Corn. In Simbirsk, Kursk, Kherson and Poltava governments and near Batum in the Caucasus smut, *Ustilago maydis* DC. was abundant upon corn.

Proso (*Panicum miliaceum* L.) was injured by smut, *Ustilago panici miliacei* Wint. in Kherson and Kursk governments.

II. GRASSES AND FORAGE CROPS.

Clover. *Uromyces trifolii* Lev. was abundant in all but the southwestern part of Russia. *Erysiphe martii* Lev., and *Peronospora trifoliorum* DeBary although often very destructive were not injurious in 1903. *Phyllachora trifolii* Fuckel was very injurious in Pskoff, Smolensk and Kursk governments, affecting *T. repens* more seriously than the other clovers.

Timothy grass. Ergot, *Claviceps microcephala* Wallr. and *Scolecotrichum graminis* Fuck. occurred both in Kursk government and the former also in Pskoff government.

Triticum repens L. and *T. cristatum* were affected seriously by *Epichloe typhina* Tul. in Krcson government. The same disease affected timothy grass in Central Russia.

Awnless Brome Grass. From Kursk government was reported a disease which proved to be due to bacteria compared by the author to the bacterial disease of sorghum in America.

Alfalfa. In Stavropol government in southeastern Russia alfalfa suffered somewhat with *Pseudopeziza trifolii* Fuck., while *Septoria medicaginis* Rob. & Desm. was reported from near Smolensk in West-Central Russia.

Festuca elatior as well as wheat and other grasses was affected by *Septoria tritici* Desm. in Stavropol government.

III. VEGETABLES AND GARDEN PLANTS.

Tricholoma sordidum Fr. growing in the soil caused the death of vegetables planted therein in Moscow government.

Potato. *Phytophthora infestans* DeB. was very injurious in Central and Northern Russia in 1902; in 1903, however, it was rare in those regions, and not generally destructive anywhere in Russia proper. In Keletz government in the low lands the loss reached 20 to 80 per cent, the early sorts being most susceptible. The varieties Gratia and Blanc-Riesen proved most resistent. In points in Transcaucasus the disease was very destructive.

Cercospora concors Sacc. known before only near Berlin, was discovered in Russia in 1900 and in 1903 was found in three rather widely separated governments of Central and Northwestern Russia.

Tomato. *Septoria lycopersici* Speg., discovered at one spot in Transcaucasus in 1901, was found in 1903 as far North as Rostoff on Don and in many places in Caucasus. *Phytophthora infestans* DB. was found on tomatoes near Kursk. Fruit spots caused by *Cladosporium*, *Macrosporium* and *Fusarium* were found near Kursk and, except the third, in Transcaucasus.

Egg-Plant. *Phyllosticta hortorum* Speg. was found on the leaves only, of egg-plants in Transcaucasus.

Cabbage. *Olpidium brassicae* Dang., attacking the hypocotyl of seedling cabbage was reported from Lifland and Caucasus. *Plasmodiophora brassicae* Wor. occurred throughout Northern Russia. *Sclerotinia libertiana* Fuck., causing rot of cabbage was reported from Smolensk government while *Peronospora parasitica* Tul. occurred to a limited extent in Kursk government.

Asparagus. The rust, *Puccinia asparagi* DC., occurs in Russia as yet only sporadically but has been increasing from year to year. *Leptosphaeria circinans* Sacc. was injurious in Transcaucasus.

Pea. *Erysiphe polygoni* DC. was very prevalent in many parts of Russia. *Uromyces pisi* DB. was of more than usual severity in Smolensk, Lifland, Moscow and parts of Simbirsk governments. In much the same region *Peronospora viciae* DB. was also rather injurious. The pea anthracnose, *Ascochyta pisi* Lib., attacked chiefly the garden sorts, only rarely the field peas in the same general district.

Bean. *Uromyces appendiculatus* Lev. occurred in Central and Northwestern Russia, *Isariopsis griseola* Sacc. in the same region and in Caucasus, and anthracnose, *Gloeosporium lindemuthianum* B. & C. in Caucasus. Of special interest is the occurrence in Transcaucasus of *Bacillus phaseoli* E . F. Smith.

Cucumber. *Scolecotrichum melophthorum* Prill. & Delacr. is sporadically found over a wide region of Russia but is easily controlled by Bordeaux mixture. *Gloeosporium legenarium* Sacc., found for the first time in Russia in 1901 was still confined in 1903 to the government of its discovery and one other, in North Central Russia. *Peronospora* (*Plasmopara*) *cubensis* B. & C. was observed in Russia for the first time in 1902, in Tver government. In 1903 it was exceedingly destructive in Kursk government; while apparently the same disease destroyed the whole crop in Ussuri district in extreme Eastern Siberia.

Pumpkin. *Sphaerotheca humuli* Burr. was widespread in Southern Russia. The perithecia are extremely rare, so that not until 1903 was Jaczewski able to find any and so determine the species.

Watermelon. For the first time outside of North America the fungus *Cercospora citrullina* Cooke was found in Caucasus in 1903.

Flax. Wilt, *Fusarium lini* Bolley, was found by Jaczewski and Bolley in all the flax-growing regions of Russia. *Melampsora lini* Tul., a very destructive rust, occurred in Lifland, Pskoff and Smolensk governments.

Tobacco. Mosaic disease, ascribed to Bacteria, occurred in Little Russia and Caucasus. Two spot diseases of the leaves were observed; *Phyllosticta tabaci* Pass. in Voronezh government and in Transcaucasus and *Ascochyta nicotianae* Pat. in Transcaucasus. In Crimea the seed-beds were ravaged by *Pythium debaryanum* Hesse. Burial of the diseased plants caused them to send out new roots above the point of injury and saved them.

Sunflower. The rust, *Puccinia tanaceti* DC., from the sixties on has proved so destructive that culture of the sunflower had to be given up in some regions in Southern Russia. It is very abundant throughout all Southern Russia and even in Transcaucasus. Experiments demonstrated that soaking the seeds 2 to 3 hours in formalin (300 of water to 1 of the commercial strength) before sowing almost totally prevented the rust while untreated seeds from the same lot gave very badly rusted plants.

Sclerotinia libertiana Fuck. was only locally injurious in Smolensk, Pskoff and Kursk governments, although in the wet season of 1902 it was very destructive.

Mulberry. Sphaerella mori Fuckel on the leaves, *Polyporus hispidus* Fr., on the trunks and *Dematophora necatrix* R. Hartig on the roots occur widespread in Transcaucasus.

Onion. Peronospora schleidenii Unger was injurious to the onion in Pskoff and Kursk governments.

Spinach was attacked and almost completely destroyed by *Peronospora effusa* Rabh. at Tsarskoe Selo. In Smolensk government *Septoria spinaciae* West. was harmful.

Beet. Various fungi producing leaf spots were abundant in Western and Central Russia, viz: *Cercospora beticola* Sacc., *Phyllosticta betae* Oudem., and *Septoria betae* West.

Poppy. Near Riga, in Transcaucasus, and in Kursk government *Peronospora arborescens* L. was abundant.

Carrot. In Keletz government carrots suffered from the attacks of *Sclerotinia libertiana* Fuck.

IV. FRUIT TREES.

Apple. Rust, *Gymnosporangium tremelloides* R. Hart., was abundant in Northwestern, Central and South Central Russia and in all Caucasus. It was not so severe as in 1901 when it literally defoliated the trees in Smolensk government. The teleutospore host is *Juniperus communis* L. Scab, *Fusicladium dendriticum* Fuck. occurred wherever apples are grown in Russia. *Monilia fructigena* Pers. was abundant in Northwestern, Central, Western, Southwestern and Southern Russia and in Caucasus.

Leptothyrium pomi Sacc. and *Spilocaea pomi* Fr. were met with only in Southern Russia, and that not abundantly. *Phyllosticta briardi* Sacc. was abundant in Central and Northern Russia, in Crimea and in Caucasus along the Black Sea. *Sphaerotheca mali* Burr., on the contrary, was confined to one locality in the last mentioned region. *Sphaeropsis malorum* Peck, the cause of black rot of the fruit and canker of the limbs was reported in 1903 from that same region in Caucasus, from Kharkor government in Russia and from Samarkand Province in Turkestan. Crown-gall, ascribed by the author to *Dendrophagus globosus* Toumey, was reported only from St. Petersburg government although occurring in many parts of Russia the preceding year. *Hydnum schiedermayeri* Heufler has proved destructive in only one locality at Simbirsk.

Pear. Rust, *Gymnosporangium sabinae* W., is confined to those regions where the teleutospore host, *Juniperus sabina* L. grows, *i. e.,* to Southern Russia where it is very abundant. In Poltava government not only the leaves but also the twigs were attacked. *Septoria piricola* Desm. is widespread in Russia, being injurious especially to nursery trees. In 1903 it was most abundant in those governments along the Black Sea. Scab, *Fusicladium pirinum* Fuck., ordinarily widespread in Russia, was found in abundance in 1903 only in points in Caucasus and in Crimea and vicinity. In much the same region, but spreading further North *Monilia fructigena* Pers. was destructive. In Poltava government *Stigmatea mespili* Sor. was injurious to the foliage of both cultivated and wild pear trees.

Quince. *Monilia fructigena* Pers., *Sclerotinia cydoniae* Schell., and *Podosphaera oxyacanthae* DB. occurred in 1903 only in limited areas, respectively Transcaucasus, the vicinity of Kiev, where the trouble was very destructive, and on the southern coast of Crimea.

Plum. Leaf spot due principally to *Phyllosticta prunicola* Sacc., but also to *Cercospora circumcissa* and *Sphaerella bellona,* occurred in Northwestern and Central Russia and along the Black Sea in Caucasus. In Kursk government all the trees were completely defoliated in August, and even the fruits were attacked. *Polystigma rubrum* Tul. caused considerable injury to foliage in the Southern governments as well as in Simbirsk government. Rust, *Puccinia pruni-spinosae* Pers., was seriously injurious only in Smolensk and Kursk governments, while *Monilia cinerea* Bon. was of importance in Smolensk and and Voroneh governments only. Plum pockets, *Exoascus pruni* Fuck., caused considerable loss in Lifland, Mogileff and Kursk governments, the loss in the last two being one-third and over one-third, respectively, of the fruits. The disease first appeared destructively in Kursk government in 1900 and each succeeding year has increased in severity.

Cherries. Witches brooms, *Exoascus cerasi* Sadeb., were reported from St. Petersburg, Plock and Tambov governments, which are widely separated from one another. *Gnomonia erythrostroma* Fuck. causing a leaf spot occurred in Kharkov government and in Caucasus while a leaf and fruit spot due to *Clasterosporium amygdalearum* Sacc. occurred in Caucasus, in Crimea, and in Kursk government. A third leaf spot, *Cercosporella cerasella* Sacc. occurred in the two last named localities only. *Monilia cinerea* Bon. caused serious injury to cherries in parts of Kursk government, in many places in Transcaucasus, and at Balaclava in Crimea.

Peach. Leaf curl, *Exoascus deformans* Fuck., was found in 1903 in Kherson government and Crimea, both on the Black Sea, especially on Arabian varieties, in Transcaucasus and in Transcaspian Province, Turkestan, where it practically defoliated the trees in May. Other leaf troubles were *Clasterosporium amygdalearum* Sacc., in much the same localities as the preceding, except Turkestan, and *Puccinia pruni-spinosae* Fuck. observed near Batum in Caucasus. Considerable injury was occasioned to the fruits in many localities in Transcaucasus by *Gloeosporium lacticolor* Berk. Peach yellows was reported from Sotchi in Caucasus.

Apricot. *Phoma armeniaca* Thüm. was so destructive to the fruits of the apricot in Transcaucasus that they were very rare in the markets.

Almond. *Clasterosporium amygdalearum* Sacc., leaf spot, and *Gloeosporium amygdalinum* Brizi, anthracnoses of fruit, twigs and leaves, were respectively in Transcaucasus and near Crimea.

V. BERRIES.

Gooseberry. Mildew, *Sphaerotheca mors-uvae* B. & C., was first observed in Russia in 1901; by 1902 it had spread to six governments, and in 1903 it was reported from nearly all parts of Russia and from Tomsk in Siberia; Transcaucasus remained as yet unaffected. In contrast with this very destructive parasite is *Microsphaera grossulariae* Lev., which is well known in Europe, but causes little damage. It occurred near Riga and in Smolensk and Kursk governments. *Septoria grossulariae* West. was quite abundant in Western and Central Russia. Rust, *Puccinia pringsheimiana* Kleb., occurred abundantly in Novgorod and Vladimir governments, and also in Smolensk government where it attacked and destroyed more than half the fruits. Although abundant the three previous years on the leaves, the fruits were not attacked until 1903.

Black currant. *Cronartium ribicola* Dietr. was met with in 1903 in several widely separated places, *e. g.*, Lifland in North-eastern Russia, Lodz in Poland, Kursk government in South Cen-

tral Russia, and Tomsk in Siberia. At Tomsk *Sphaerotheca mors-uvae* B. & C. was also found as well as in one other locality. "*Puccinia Ribis nigri acutae* Klebahn" with teleutosporic stage on *Carex acuta* and *C. stricta*, except for Tomsk, was reported only from Northwestern Russia. *Septoria ribis* Desm. was destructive in Kursk, Smolensk and Tchernigov governments.

Red Currant. Sphaerotheca mors-uvae B. & C. was reported only from Tver, Northeast of Moscow. Anthracnose, *Gloeosporium ribis* Mont. & Desm. was rather rare, being injurious in Lifland, Smolensk and Kursk governments, in the last the plants having lost half of their leaves in July.

Strawberry. Sphaerella fragariae Lasch occurred widely in Northwestern and Central Russia, as well as near Tomsk in Siberia and in Transcaucasus.

Raspberry. Rust, *Phragmidium rubi-idaei* Wint. is widely distributed throughout all Russia, but was more severe in 1903 in Northwestern Russia and in Kursk government (South Central Russia). In the latter region two leaf spot diseases were also reported, viz., *Septoria rubi* West, and *Phyllosticta fuscozonata* Thüm.

Service berry (*Sorbus aucuparia*). The aecidial stage of *Gymnosporangium juniperinum* Wint., whose teleutospore stage occurs on *Juniperus communis* is often very destructive. It occurred in 1903 in the Central and Northwestern governments.

VI. GRAPE.

Mildew (*Plasmopara viticola* Berl. & DeToni), occurs, according to the author, extensively in all vine growing regions of Russia and only assiduous treatment can save the vineyards from destruction. It was especially abundant in Southwestern Russia, from Kherson government westward, even the isolated vineyards being attacked, mostly for the first time, in 1903. In Caucasus and Crimea the disease caused immense injury. *Uncinula spiralis* B. & C., as widely distributed, almost, as the foregoing is far from being destructive. It was especially serious in Transcaucasus and Crimea. White rot, *Coniothyrium diplodiella* Sacc., was abundant in districts in Caucasus. Anthracnose, *Gloeosporium ampelophagum* Sacc., was abundant in Fergana Province, Turkestan, in the North of Crimea and in those vineyards especially in Caucasus that were cultivated in the Georgian manner. *Cercospora fuckelii* Sacc. occurred in Samarkand Province, Turkestan and in Kherson government, Southern Russia, where it occasioned considerable injury. *Phyllosticta vitis* Sacc. occurred at Simferopol in Crimea. It was not very destructive. It differs from black-rot in this as well as in the character of the leaf-spots produced. *Fusarium zavianum* Sacc., known hitherto only from Italy was found in 1903 in Erivan government,

Transcaucasus. Sooty mould, *Capnodium salicinum* Mont., was reported from Elisabetpol government, Transcaucasus. *Dematophora necatrix* R. Hart, was abundant along the Southern coast of Crimea; the following varieties being most resistant to the disease: Verdelho de Madeira, Sersial de Madeira, Pedro Ximenes, Cabernet Sauvignon, Mourvède, Carignagne, Kokours, Tchaush, Abbourla, and Saperavi.

VII. FOREST TREES.

Pine. The one to four year old trees, especially, are often affected with falling of the leaves, due to the fungus *Lophodermium pinastri* Chev. The disease is essentially only a trouble of the nursery trees. It was most severe in the central part of Russia. One of the most dangerous fungi to the pine forests is *Polyporus annosus* Fr. as its spreads not only by means of its spores but also through the ground. In Russia it has been found as yet only in Lomzhin and Mogiley governments. *Caeoma pinitorquum* A. Br., the aecidial stage of *Melampsora pini-torquum,* attacks the young trees and one year shoots of older trees, in many parts of Northern Russia. In 1903 it was also found in Kharkov government, in South Central Russia. Little injury results from the attacks of *Coleosporium senecionis* W. on the leaves. It was found in Smolensk and Tula governments. Causing more serious injury is *Peridermium pini* forma *corticola* Lev. which was reported in 1903 from Tobolosk government in Siberia. In seed beds in Perm government the seedlings just emerging from the ground were destroyed by *Fusarium pini* R. Hart., found in 1903 for the first time in Russia.

Larch. In Smolensk government the larch was attacked by *Caeoma laricis* W., the aecidial stage of *Melampsora betulae* on birch and *M. tremulae* on aspen.

Birch. *Melampsora betulina* Wint. is very widely distributed in Russia, in 1903 being especially abundant in Smolensk and St. Petersburg governments; as well as in Tomsk and Tobolsk governments in Siberia. *Polyporus betulinae* Fr. is abundant, sometimes attacking fifty per cent of the trees in the forest. In 1903 it was reported from the Northwestern governments of Russia as well as from Askold Island, near Vladivostok.

Oak. Injury by *Daedalia quercina* Pers. was reported from points in Caucasus and in Kovno government, while *Hirneola cochleata* Fr. was said to be injurious on Askold Island near Vladivostok. In Kherson government, bordering on the Black Sea, seedlings were covered by the saprophytic slime mould *Spumaria alba* DC. which caused some injury.

Elm. In Simbirsk government and along the coast of the Black Sea in Caucasus the elm was attacked by *Dothidiella ulmi* Win.

Linden. *Cercospora microsora* Sacc. was abundant in Simbirsk and Smolensk governments.

Willow. *Melampsora salicis* is widely distributed in Russia being reported from the Northwestern and North Central governments.

Ash. In the Caucasus, in two districts, the ash was reported affected by *Phyllactinia suffulta* Sacc.

Box. In Caucasus the foliage of the box was affected by *Puccinia buxi* DC. and by a lichen *Pilocarpon leucoblepharum* Wainio, the latter doing serious injury.

VIII. GARDEN AND ORNAMENTAL PLANTS.

Sooty mould occurred on house and greenhouse plants in various parts of Russia.

Haw, (*Crataegus oxyacantha*). Two species of *Gymnosporangium* attack this tree, viz., *G. confusum* Plow., with teleutsporic stage on *Juniperus sabina* L., and *G. clavariaeforme* Wint. with teleutospores on *J. communis.* The first is abundant in Southern Russia, also being reported from Tiflis in Caucasus; the latter in Central Russia.

Rose. *Phragmidium subcorticium* Wint. is found on the wild and cultivated rose very abundantly. In 1903 it was reported principally from the Northwestern governments, also from Korsk government. *Sphaerotheca pannosa* Lev. was found in the Central and also St. Petersburg governments. *Coniothyrium fuckelli* Sacc. causing the death of the stems was reported from Simbirsk government.

Iris. Rust, *Puccinia iridis* Wint., was reported on various species of *Iris* from Tiflis in Caucasus. *Heterosporium gracile* Sacc. was observed in Kursk government.

Pansy. The smut *Urocystis kmetiana* Magn., which develops its spores in the flower buds, was found in the vicinity of Moscow. It had hitherto been unknown outside of Hungary.

Lilac. In Ekaterinoslav and Kiev. governments lilacs were affected with leaf spots due to *Gloeosporium syringae* Allescher.

Hollyhocks were affected with *Puccinia malvacearum* Mont. in Kursk government, but not to any serious extent.

Peony. *Cronartium asclepiadeum* Fr. was reported from Smolensk government, while in Kursk government *Septoria macrospora* Sacc. was quite abundant.

Philadelphus coronaria was affetced by *Ascochyta philadelphi* Sacc. in Kursk government.

IX. TROPICAL AND SUBTROPICAL PLANTS.

Rice. The disease, known in Italy as Brusone, and ascribed to *Piricularia oryzae* Br. & Cav. occurred near Tiflis and Batum in Caucasus, causing much inquiry.

Cotton. In 1902 at the experiment station at Tashkent, in Turkestan, about sixty per cent. of the cotton was destroyed by *Neocosmospora vasinfecta* E. F. Smith, the native sorts alone being attacked, the American sorts remaining immune. In 1903 the disease did not reappear. A bacterial gummosis of the base of the stems proved quite injurious, however, to three varieties of native cotton. Anthracnose, *Colletotrichum gossypii* Southw., was found in 1902 and 1903 in Caucasus, as was the areolete leaf spot, *Ramularia areola* Atks., for the first time in 1903.

Sesame. In 1902 a wilt disease of sesame was found at the Golodnaya Steppe experiment station in Turkestan. It was caused by the fungus *Neocosmospora vasinfecta* var. *sesami* Jacz. The reviewer collected this at the same place in September of that year. In Transcaucasus a species of *Ascochyta* caused injurious leaf spots.

Peanut. In various spots in Transcaucasus the peanut suffered with the attacks of two different rusts, viz., *Puccinia arachidis* Speg. and *Uromyces arachidis* P. Henn.

Ramie. *Metasphaeria boehmeriana* Sacc. on the stems, and *Cercospora boehmeriana* Peck on the leaves were abundant at several points in the Caucasus.

Tea. The tea plantations at points along the coast of the Black Sea in the vicinity of Batum suffered severe injury some years from *Pestalozzia guepini* Desm. In 1903, however, the injury was slight. The same disease affected Camellia, Magnolia, Rhododendron, Lemon and Almond.

Citrus spp. The disease known elsewhere as Mal di Gomma, due to *Fusarium limoni* Br., occasioned serious injury in Caucasus near the Black Sea. Sooty mould, *Meliola penzigi* Sacc. was also abundant, also attacking *Camellia*.

Olive. As a result of the attacks of *Cycloconium oleaginum* Cast., affecting the foliage, the yield of olives at some points in Caucasus along the Black Sea was reduced one-half. In the same region sooty mould, *Antennaria elaeophila* Mont., was abundant. The anthracnose due to *Gloeosporium olivarum* Almeida became a serious pest at one point in the same region. It had never been destructive in Caucasus before, although very destructive in Portugal.

Fig. The only disease of the fig noted in 1903 was rust, *Uredo fici* Cast. This was abundant near Batum, but further North along the coast was not found.

Kaki. Up to 1903 the only disease of the Japanese Persimmon that had been observed in Caucasus was *Cercospora kaki* E. & E. near Batum. In that year, however, the fruits were attacked when half grown, and caused to fall, by *Botrytis diospyri* Brizi.

U. S. Department of Agriculture,
Washington, D. C.

NOTES FROM MYCOLOGICAL LITERATURE XVI.

W. A. KELLERMAN.

MYCOLOGICAL NOTES, C. G. LLOYD, NO. 20:221-244, Pl. 55-69, June 1905, treats of the Lycoperdons of the United States. Only a brief discussion of characters is given, supplementary to the outline for the European species. The spores can be divided into two classes, (1) the *large rough* spores 6-8 mic., and (2) the small or medium (4-5 mic.) smooth or slightly rough spores. The three important papers noted are those of Peck, Trelease and Morgan. Mr. Lloyd makes the following sections, for the American species, namely: Atropurpureum, Gemmatum, Pratense, Polymorphum, and Spadiceum sections. Full notes and comments relative to the various species are given, and in each case a list of localities for the specimens in Mr. Lloyd's collection. Thirty-five species of Lyncoperdons are included.

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THE FOLLOWING MYCOLIGICAL ARTICLES were published in 1904 in the Bulletin de l'Académie internationale de Géographie bontanique (ancien Monde des Plantes) [Tome XIII]: Contribution a la Flore mycologique de l'Auvergne, M. L. Brevière; Liste des Champignons supérieure de la Vienne, M. J. Poirault.

TERMS APPLIED TO THE SURFACE AND SURFACE APPENDAGES OF FUNGI by William A. Murrill, published in the April No. of Torreya (1905) is an excellent glossary of mycological terms. A good feature of the paper is found in the fact that after the alphabetical

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IN BULLETIN DE L'HERBIER BOISSIER TOME V, 1905, 31 May 1905, there is published an article of ten pages entitled Encore La Schlamydomyxa par E. Penard; also one on Lichenes a cl. Damazio in Brasilia lecti, Auctore A. Zahlbruckner.

BEITRAEGE ZUR BIOLOGIE DER UREDINEEN (Phragmidium subcorticum [Schrank] Winter, Puccinia caricis montanae Ed Fischer) is an Inaugural-Dissertation zur Enlangung der Doktorwürde von Walter Bandi; pp. 1-36. Druck von C. Heinrich, Dresden, 1903.

THE FOLLOWING MYCOLIGICAL ARTICLES were published in 1904 in the Bulletin de l'Académie internationale de Géographie bontanique (ancien Monde des Plantes) [Tome XIII]: Contribution a la Flore mycologique de l'Auvergne, M. L. Brevière; Liste des Champignons supérieure de la Vienne, M. J. Poirault.

TERMS APPLIED TO THE SURFACE AND SURFACE APPENDAGES OF FUNGI by William A. Murrill, published in the April No. of Torreya (1905) is an excellent glossary of mycological terms. A good feature of the paper is found in the fact that after the alphabetical

list of the words defined, there is a Synopsis of the terms under the subheads of General terms applied to the surface as a whole; Terms applied to the Margin in particular; Surface Markings and Surface Coverings. For beginners and amateurs this is the best glossary we have yet seen.

In the Proceedings of the Linnean Society of New South Wales, 1904, Part 4, November 30th, we find an account of the bacterial origin of Macrozamia Gum, by R. Greig Smith. The author says there can be no doubt that the gum exuded from the plant is produced by a bacterium which he describes and names as Bacillus macrozamiae.

R. Greig Smith reports a Yellow Race of Bacillus Pseudoarabinus, Proc. Lin. Soc. N. S. W. 1904, Part 4, Nov. 30, which, though found on the plant next named, has probably nothing to do with the production of the mucilage of the quince. The white and yellow races of Bacillus pseudoarabinus were obtained as such and preserved their respective colors for a year under laboratory conditions.

Verhandlungen des Botanischen Vereins der Provinz Brandenburg, Vol. 46, 1904, contains the following mycological contributions: P. Hennings, Zwei neue Cudonieen aus der Umgebung Berlins [Cudoniella buckowensis P. Henn. n. sp., an abgestorbenen Carexhalmen zwischen Sphagnum; Cudoniella osterwald P. Henn. n. sp., auf feuchten Sandboden zwischen Jungermannia bicuspidata und Algenüberzügen); Phaeosphaerella Marchantiae P. Henn. n. sp. [auf abgetrockneter Marchantia polymorpha]; Otto Jaap, Erster Beitrag zur Pilzflora der Umgegend von Putlitz [list of species].

The Yearbook of the United States Department of Agriculture for 1904 (issued in 1905) contains many interesting papers, but one only is mycological, namely, Plant Diseases in 1904, by W. A. Orton — his customary annual list.

A Key to the Stipitate Polyporaceae of temperate North America is given by William A. Murrill in the February and March Nos. of Torreya, 1904. It is carried out to the species — and the usual full diagnoses given serve well for use in identification of specimens. Dr. Murrill's refined genera will be understood by the following which we copy:

Surface of hymenophore covered with reddish-brown varnish...Ganoderma
Surface of hymenophore not as above —
  Tubes hexagonal and radially elongated..................Hexagona
  Tubes not as above —
    Stipe compound ....Grifola
    Stipe simple —
      Context white —
        Plants fleshy, terrestrial ....Scutiger

Plants tough, epixylous —
Pileus inverted, erumpent from lenticels. . Porodiscus
Pileus erect, not erumpent —
Context homogeneous, firm. . . . . Polyporus
Context duplex, spongy above, woody below . . . . Abortiporus
Context brown —
Hymenium concentrically lamelloid. . . . . Cycloporus
Hymenium poroid —
Spores white . . . . Romellia
Spores brown —
Pileus erect, stipe central. . . . . Coltricia
Pileus inverted, pendent. . . . . Coltriciella

A KEY TO THE PERENNIAL POLYPORACEAE OF TEMPERATE NORTH AMERICA, by William A. Murrill, is published in Torreya. 4: 165-7, November 1904. The genera which are used in the paper, as well as the important characters on which the divisions are made, can best be shown by transcribing the first section of the Key, which is as follows:

Hymenium at first congealed by a valva . . . . Crytoporus
Hymenium free from the first —
Surface covered with reddish varnish, context corky. . . . . . Ganoderma
Surface not covered with reddish varnish, or, if so, context woody —
Context and tubes white or pallid. . . . . Fomes
Context and tubes brown or dark red —
Hymenophore subsessile, caespitose, arising from a common trunk or tubercle . . . . Globifomes
Hymenophore truly sessile, dimidiate or ungulate, simple or imbricate —
Pileus covered with a horny crust, context punky. . . . . Elfvingia
Pileus not covered with a horny crust, or, if encrusted, context woody, ferruginous. . . Pyropolyporus
Context dark purple or black. . . . . Nigrofomes

PANAEOLUS ACIDUS IS A NEW SPECIES described by D. R. Sumstine in Torreya, 5: 34, Feb. 1904. In general it resembles Psilocybe foenisecii (Pers.) Fr., but is readily distinguished by the black spores. It was growing in a cluster on the bottom of a box in a cellar. The box contained a large bottle of acetic acid which had been broken and the contents emptied on the bottom of the box. The plant grew on this saturated wood.

A LIST OF SEVENTY-SIX SPECIES, THE BOLETACEAE OF PENNSYLVANIA, by D. R. Sumstine, is given in the December No. of Torreya, 1904. This is a remarkably large number, being nearly two-thirds of all the species known in the United States.

THE REPORT OF THE STATE BOTANIST, 1904, CHARLES H. PECK, New York State Museum Bulletin 94 (Botany 8): 1-58 Plates 87-93, P-R, July 1905, is one of the monthly publications of the New York State Education Department (Bulletin 349), but it apparently is a part of the 58th Report if we interpret correctly

the running headline of the plates. For the mycologist the parts specially interesting are the report of several species new to the State Museum; the following species new to science, namely, Boletus atkinsoni, B. nobilis, B. rugosiceps, Clavaria botrytoides, C. xanthosperma, Cortinarius heliotropicus, Lactarius brevis, Lactarius colorascens, Pholiota appendiculata, Hygrophorus laurae decipiens; a popular account of eight or nine edible fungi; and ten colored plates representing fourteen species.

A NEW SPECIES OF LEMBOSIA BY WILLIAM TITUS HORNE, is published in the Bulletin of the Torrey Botanical Club, 32: 69-71, Feb. 1905. It occurs on green stems of Vanilla planifolia Andr. The material was sent by P. H. Rolfs of the U. S. Subtropical Laboratory at Miami, Florida, and the species is named Lembosia rolfsii Horne.

IN BERICHTE DER SCHWEIZERISCHEN BOTANISCHEN GESELLSCHAFT, Heft XIV, 1904, Ed. Fischer publishes his Fortsetzung der Entwicklungsgeschichtlichen Untersuchungen über Rostpilze. Previous installments (10 sections) were published in the same periodical for 1900, 1901 and 1902. Section 11 is entitled Zur Kentniss der Schweizerischen Gymnosporangien, but space is wanting here even to summarize the results. The other sections pertain to the following: 12, Beitrag zur Kentniss der alpinen Weiden-Melampsoreen; and 13, Puccinia orchidearum-digraphidis Kleb.

ROB. STAEGER REPORTS INTERESTING INFECTIONS-VERSUCHE mit Gramineen-bewohnenden Claviceps-Arten in the Botanische Zeitung 1903. Heft VI-VII, p. 111-158. The material used was all collected in Switzerland and the following forms were separated: 1. Claviceps purpurea on Secale cereale and about fifteen other species (including several species of Poa); 2. Claviceps on Glyceria fluitans doubtless identical with Cl. wilsoni Cke.; 3. Claviceps purpurea on Lolium perenne, L. italicum, L. temulentum, L. rigidum, and Bromus erctus; 4. Claviceps purpurea on Poa annua; Claviceps purpurea on Brachypodium silvaticum; and Claciceps microcephala on Phragmites communis, Nardus stricta, Molinia coerulea, and Aira caespitosa.

W. A. ORTON, IN THE YEARBOOK OF THE UNITED STATES DEPARTMENT OF AGRICULTURE for 1904, published in 1905, continues his annual notes on the occurrence and distribution of Plant Diseases in 1904, this being the sixth installment. Here as elsewhere we may see the influence of the weather conditions upon epidemics of diseases caused by plant parasites, especially (so the author states) in the case of the destructive outbreak of rust in cereals, and the relative absence of downy mildews on account of drought in the Southern and Eastern States. The arrangement of the several diseases in this Report is under the subheads of Pome Fruits; Stone Fruits; Small fruits as Citrus, etc.; Field

and Garden vegetables and Tobacco; Cereals and Forage crops; Fiber Plants; Nuts, Forest trees, and Shade trees; and Greenhouse and Ornamental Plants.

THE TWENTIETH CENTURY OF ELLIS AND EVERHART'S FUNGI COLUMBIANI, issued by E. Bartholomew, appeared Nov. 15, 1904. The genera represented by some four to twenty-seven species each are as follows: Aecidium (4 sp.), Diaporthe (4 sp.), Puccinia (27 sp.), and Uromyces (6 sp.).

AN UNDESCRIBED ALTERNARIA AFFECTING THE APPLE is reported by B. O. Longyear in Science, N. S. 21:708, May 5, 1905. The fungus was first found in Michigan, later in Colorado. It attacks the blossom end of the fruit, the affected area remaining small or extending over the whole fruit which then becomes a shrivelled dry hard mass. Inoculation experiments are being carried on.

PROFESSOR T. J. BURRILL GAVE THE PRESIDENTIAL ADDRESS before the Buffalo meeting of the American Microscopical Society, Aug. 24, 1904, on Microorganisms of Soil and Human Welfare. The principal sub-heads of the lecture were Rock reducers, Nitrifiers, Root-tubercle Bacteria, and Nitrogen Fixation by Free Bacteria.

IN NOVAE FUNGORUM SPECIES — II, auctoribus H. et P. Sydow (Ann. Mycolog. 3:185-6, Apr. 1905) three of the eight new species described are American — from Utah. These are as follows: Asteroma garrettianum on Primula, Ascochyta garrettiana on Orthocarpus tolmiei, and Didymaria conferta on Wyethiea amplexicaulis.

A PRELIMINARY REPORT ON THE HYMENIALES OF CONNECTICUT, by Edward Albert White, forms Bulletin No. 3, Connecticut State Geological and Natural History Survey. The annotated list is preceded by popular explanations of the groups and a few keys. The 40 plates are elegant half-tones, printed on heavy plate paper.

PROFESSOR THEOBALD SMITH GAVE AN ADDRESS on Some Problems in the Life History of Pathogenic Microorganisms, before the International Congress of Arts and Science, St. Louis, Mo., Sept. 24, 1904; published in Science, N. S., 20:817-832, Dec. 16, 1904. He supported the hypothesis of the general phenomenon of infection as follows: That the tendency of all invading micro-organisms in their evolution toward a more highly parasitic state is to act solely on the defensive while securing opportunity for multiplication and escape to another host.

ERNEST S. SALMON'S PAPER ON SPECIALIZATION OF PARASITISM IN THE ERYSIPHACEAE, III. (Ann. Mycolog. 3:172-184, Apr. 1905) deals with Inoculation-experiments with the asco-

spores of the "biologic form" of Erysiphe graminis DC. on Bromus commutatus, and Inoculation-experiments with conidia of the "biologic form" of E. graminis on wheat. He finds further evidence in support of the view that "biologic forms" are as sharply and distinctively marked off in the ascosporic as in the conidial stage. The second set of experiments showed that the fungus after being kept for five generations on Hordeum silvaticum showed no signs of losing its power of infecting wheat, the original host plant. Strangely enough, the successive generations of the fungus produced on H. silvaticum showed a weaker instead of a stronger power of infecting this host.

IN MYCOLOGISCHE FRAGMENTE, LXXVI, ZUR SYNONYMIE EINIGER PILZE, (Ann. Mycolog. 3:189, April 1905) Franz v. Höhnel deals with twenty-four cases of fungi, whose synonomy he gives as based on his investigations. We may refer to a species on Robinia pseudacacia, namely Phleospora robiniae (Libert) v. Höhnel, the synonomy for which he gives as follows: 1837, Ascochyta robiniae Libert; 1849, Septoria robiniae Desm., 1849, Ascochyta robiniae Lasch.; 1854, Septosporium curvatum Rabh.; 1884, Septoria curvata Sacc.; 1891, S. curvata var. diversispora Fau.; and 1902, Fusarium vogelii P. Henn.

COMPTE RENDUS DES SEANCES DE L'ACADEMIE DES SCIENCES, Paris, tome CXXXVIII, 1904. The mycological articles are as follows: Vancy et Conte, Utilization des Champignons entomophytes pour la destruction des larves d'Altises; Viala et Pacottet, Sur les Verrues des Feuilles de la Vigne; Vuillemin, Nécessité d'instituer un ordre des Siphomycètes; Dangeard, Sur le sité d'instituer un ordre des Siphomycètes et un ordre de Microsiphonées, parallèles à l'ordre des Hyphomycètes; Dangeard, Sur le développement du périthèce des Ascobolées; Viala et Pacottet, Sur la culture du Black Rot; Coupin, Sur l'assimilation des alcools et des aldéhydes par le Sterigmatocystis nigra; De Cordemoy, Sur une fonction spéciale des mycorhizes des racines latérales de la Vanille; Gallaud, De la place systématique des endophytes de la Chidées; Molliard, Mycélium et forme conidienne de la Morille; Dangeard, Sur le developpement du perithèce chez les Ascomycètes; De Istvanffi, Sur la perpetuation du Mildiou de la vigne; Bernard, Le Champignon endophyte des Orchidées; Coupin et Friedel, Sur la biologie du Sterigmatocystis versicolor; Dangeard, Observations sur les Gymnoascées et les Aspergillacées; Vuillemin, Sur les variations spontanées du Sterigmatocystis versicolor.

COMPTE RENDUS DES SEANCES DE L'ACADEMIE DES SCIENCES, Paris, tome CXXXIX, 1904, contains the following mycological articles: Mme. Z. Galin-Gruzewska, Resistance à la dessication de quelques Champignons; Guilliermond, Recherches sur la germination des spores chez quelques levures; Mlle. M. Stefan-

owska, Sur la loi de variation de poids du Pencillium glaucum en fonction de l'âge; Dauphin, Sur l'appareil reproducteur des Mucorinées; Viala et Pacottet, Sur le développement du Black Rot; Eriksson, Nouvelles recherches sur l'appareil vegetatif de certaines Uredinées; De Cordemoy, Sur les Mycorrhizes des racines laterales des Poiviere.

HYMENOMYCETES NOVI VEL MINUS COGNITI cura Ab. J. Bresadola (Ann. Mycolog. 3: 159-164, April 1905) though referring to European species may here be noted. They are nearly all new and the list is as follows: Tricholoma sulphurescens, Pleurotus rhodophyllus, Volvaria fuscidula, Pluteus murinus, P. diettrichii, Inocybe muricellata, I. similis, I. umbrinella, I. patouillardii, Naucoria flava, Clarkeinda cellaris, Polyporus subtestacens, P. friesii, Trametes nigrescens, Corticium roseocremeum, C. flavescens, C. trigonospermum, Septobasidium hagliettoanum. S. mariani, and S. cavarae.

IN NOTAE MYCOLOGICAE AUCTORE P. A. SACCARDO, Ann. Mycolog. 3: 165-171, April 1905, there are twenty-five new species described, the following being American (Mexican): Orbilia coleosporoides on Didymaea mollis, Septoria hiascens on Arbutus, and Phleospora bonanseana on Schinus mollis. New genera proposed are Orbiliopsis (subg.), and Fioriella.

GEORGE FRANCIS ATKINSON IS THE AUTHOR OF A COLLEGE TEXT-BOOK OF BOTANY, pp. I-XVI, 1-737, published by Henry Holt & Co., New York, 1905. Chapters XIX to XXII inclusive are devoted to the Fungi. A good general account is given of several representatives illustrated by many etchings and halftones. The final chapter is devoted to the classification of fungi, the genera orders and families being briefly diagnosed, — based on that presented in Engler & Prantl's Pflanzenfamilien.

ANNALES MYCOLOGICI, Vol. III, No. 2, April 1905, contains the following: Maire (Rene), Recherches cytologique sur quelques Ascomycètes; Veuillemin (Paul), Le Spinellus macrocarpus, et ses relations probables avec le Spinellus chalybeus; Bresadola (J.), Hymenomycetes novi vel minus cognoti; Saccordo (P. A.), Notae mycologicae; Salmon (Ernest S.), On Specialization of Parasitism in the Erysiphaceae, III; Sydow (H. et P.), Novae Fungorum species — II; Höhnel (Franz v.), Mycologische Fragmente; Neue Literatur; and Referate und Kritische Besprechungen.

IN NEW WORK UPON WHEAT RUST, Science, N. S., 22: 50-1, 14 July, 1905, Henry L. Bolley states that it will be interesting news to mycologists to know that we have at last definitely established the fact of the wintering of the red spores (uredospores) of a number of the important rusts in viable form, including the important species Puccinia graminis. In some cases Professor

Bolley has been able to germinate as high as eighty to ninety per cent. of all the spores under test — the experiments being carried on with Puccinia graminis exposed to the drying winds of autumn and the intense cold of a North Dakota winter. He found the spores successfully surviving upon dead leaves, dead straw and upon the partially dead or green leaves of living grain or grasses. He further says: "The matter of the barberry stage and other aecidial rusts may yet be proved to be of physiological necessity for the perpetuation of the species, but it would seem that these need no longer be believed to be a direct yearly necessity to the perpetuation of the rusts concerned."

Concerning the identity of the Fungi causing an anthracnose of the Sweet-pea and the Bitter-rot of the Apple, is the title of an article in Science, N. S. 22: 51-2, July 14, 1905, by John L. Sheldon, of the West Virginia Agriculaural Experiment Station. This recounts in brief inoculation work by an assistant which will be published in full later. Mr. Sheldon says that he noticed that there was an occasional cell of the mycelium that contained spores, in appearance the same as those borne externally on the hyphae. The article ends with the following paragraph: "It would seem, then, from the results obtained, as if the bitter-rot of the apple, the ripe-rot of the grape, and the anthracnose of the sweet pea are caused by the same fungus. A stage corresponding to the ascigerous stage of the bitter-rot has not been obtained yet in artificial cultures."

How Much Plant Pathology ought a teacher of Botany to know is discussed in the August No. of the Plant World (1905). Some idea of the scope of this paper may be obtained from the principal sub-heads which are as follows: Plants are really living things; Some differences between Plants and Animals; Sources and Causes of Plant Diseases; General Nature of Fungi; Some Facts about Plant Diseases.

In Meddelanden fran Stockholms Hoegskolas Botaniska Institut, Band VI, 1903-4, we find the following mycological articles: G. Lagerheim, Zur Kentniss der Bulgaria globosa (Schmid.) Fr. (Sarcosoma globosum et S. platydiscus Auct.); O. Rosenberg, Ueber die Befruchtung von Plasmopara alpina (Johans.).

An interesting note is found in Scince, N. S., 20: 55-6, July 8, 1904, by H. A. Harding and F. C. Stewart, on the Vitality of Pseudomonas campestris (Pam.) Smith on Cabbage Seed. This species forms no spores; and it has been previously found that when fresh boullon cultures were dried at 29° C. on cover slips and kept in darkness an exposure of 45 hours invariably sufficed to destroy the vitality of the organism. The authors of the article have found that P. campestris may live on dry cabbage seed for

at least ten months. Details are to be published later in Bull. No. 251, N. Y. Agr. Exp. Station.

Edward Bingham Copeland's New or Interesting California Fungi II, Annales Mycologici, 2:507-510, Nov. 1904, contains the following new species: Omphalia californica, Corprinus bakeri, Polyporus polychromus, Trametes sequoiae, Solenia gracilis, Verpa chicoensis, Helvella faulknerae, and Helvella hegani. The Verpa and Helvellas are illustrated. The diagnoses are in Latin.

Revised List of Indiana Plant Rusts by J. C. Arthur is published in the Proceedings of the Indiana Academy of Sciences for 1903, separates distributed December 1904. It is given in the latest nomenclature. The purpose is to embody the latest conclusions and reaffirm those remaining unchanged, as well as to correct a few errors and add a few species to the previous lists; now 105 are enumerated, but the unattached aecidia and uredo are not included. Some of the familiar names are changed, *e. g.*, Thecaphora hydrangeae (*Uredo hydrangeae*), Hyalopsora polypodii (*Uredo polypodii*), Aregma (*Phragmidium*), Caeomurus (*Uromyces*), Dicaeoma (*Puccinia*), and Jackya cnici (*Puccinia cirsii-lanceolati*).

Lentodiopsis Bubák n. g.— Eine neue Agaricaceen-Gattung aus Böhmen, von Prof. D. Fr. Bubák — is published in Hedwigia, 43:195-6, 16 Mai 1904 — the type species being striking "durch seine parasitische Natur und durch das deutlich entwickelte Velum." This white Agaric occurred on exposed roots of living Fir. Besides the two characters mentioned it is of interest in that "die schmalen weit am Stiele herablaufenden Lamellen an ihrem ende am Stiele zellenförmige Anastomasen bilden." The fungus is said to be nearly related to Lentinus and forms an interesting link between this genus and Morgan's Ohio Lentodium.

The following titles indicate the mycological matter contained in Hedwigia, Band 43, Heft 4, (12 Juni 1904): P. Hennings, Fungi S. Paulenses III. a cl. Puttemans collecti (Schluss); P. Dietel, Kurze Bemerkungen über Triphragmium Ulmariae (Schum.); P. Hennings, Fungi amazonici II. a cl. Ernesto Ule collecti; George Bitter, Zur Soredienbildung; v. Höhnel, Zur Kenntnis einiger Fadenpilze; E. Jahn, Myxomyceten aus Amazonas (Anfang).

In an article by H. Diedicke in Annales Mycologici, 2-511-4, Nov. 1904, entitled Neue oder seltene Pilze aus Thüringen, we notice many new species whose hosts are common plants, native or introduced, of this country; for example, *Fusicoccum ligustri* Died. n. sp. on Ligustrum vulgare, *Cytospora koelreuteriae* Died. n. sp. and *Microdiplodia koelreuteriae* Died. n. sp. on Koelreuteria paniculata, *Camarosporium juglandis* Died. n. sp. on Juglans

regia, *Myxosporium tulipiferae* Died. n. sp. on Liriodendron tulipifera, and *Cercospora phrygia?*

P. DIETEL IN HIS BEMERKUNGEN UEBER UREDOSPOREN VON Uromyces brevipes und Uromyces punctato-striatus, in Annales Mycologici, 2:530-3. No. 1904, states that die Uredosporen von *Uromyces brevipes* (B. et C.) treten in zwei verschiedenen Generation auf, einer primaeren und einer sekundaeren. The former differs from the latter not only in its mode of occurrence but also in the morphological characters of the spores — points not here-to fore recorded. A nearly related form, *Uromyces punctato-striatus* Cke. & Rav. on Rhus diversiloba, California, he adds: Auch bei diesem Pilze kommen primäre und sekundäre Uredosporen vor.

TWO MYCOLOGICAL ARTICLES ARE PUBLISHED IN HEDWIGIA, Band 44, Heft 1, 29 Okt. 1904, as follows: H. Rehm, Beiträge zur Pilzflora von Südamerika XIV; P. Magnus, Einige geschuldete mykologische Mitteilungen.

IN H. REHM'S PAPER, "BEITRAEGE ZUR PILZFLORA VON SUEDAMERIKA XIV," published in Hedwigia, 43:1-15, Taf. 1, 29 Okt. 1904, two new ascomycetous genera are described, as follows: *Trichophyma* Rehm n. g. Myriangiales; *Stictocylpeolum* Rehm n. g. Mollisiaceae.

INDEX TO NORTH AMERICAN MYCOLOGY.

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ABIES shastensis, host to Melomastia shastensis Earle n. sp. Bull. N. Y. Bot. Gar. 3:(292). 30 June 1904.

ACOMPSOMYCES brunneolus Thaxter n. sp., near the base of the right elytra of Corticaria sp. Proc. Am. Acad. Arts & Sci. 41:311. July 1905.

AECIDIUM carneum (Bosc.) Farlow n. n., foliicolous forms of Aecidium on Pinus palustris. Bib. Index N. A. F. 1¹:25. 1 Sept. 1905.

AECIDIUM globosum (Farl.) Farlow n. n., aecid, of Gymnosporangiosum. Bib. Index N. A. F. 1¹:49. 1 Sept. 1905.

AECIDIUM interveniens (Pk.) Farlow n. n. Bib. Index N. A. F. 1¹:58. 1 Sept. 1905.

Aecidium nelsoni (Arth.) Farlow n. n. Bib. Index N. A. F. 1^1:68. 1 Sept. 1905.

Aecidium nidus-avis (Thax.) Farlow n. n. Bib. Index N. A. F. 1^1:68. 1 Sept. 1905.

Agaricaceae, Key to the Connecticut Genera. [White] Conn. State Geolog. & Nat. Hist. Surv. Bull. 3:17-20. 1905.

Agaricus abruptibulbus Peck n. n. [A. abruptus Pk.] N. Y. State Mus. Bull. 94 (Botany 8):36. July 1905.

Agaricus abruptus Peck, *syn. of A. abruptibulbus q. v.*

Agaricus chlamydopus Peck n. n. [A. cothurnatus Pk.] N. Y. State Mus. Bull. 94 (Botany 8):36. July 1905.

Agaricus cothurnatus Pk. non Fr., *syn. of A. chlamydopus q. v.*

Agaricus halophilus Peck n. n. [A. maritimus Pk.] N. Y. State Mus. Bull. 94. (Botany 8):36. July 1905.

Agaricus magniceps Peck n. n. [A. magnificus Pk.] N. Y. State Mus. Bull. 94 (Botany 8):36. July 1905.

Agaricus magnificus Pk. non Fr., *syn. of A. magniceps q. v.*

Agaricus maritimus Pk. non Fr., *syn. of A. halophilus q. v.*

Agaricus micromegathus Peck n. n. [A. pusillus Pk.] N. Y. State Mus. Bull. 94 (Botany 8):36. July 1905.

Agaricus pilosporus Peck n. n. [A. sphaerosporus Peck.] N. Y. State Mus. Bull. 94 (Botany 8):36. July 1905.

Agaricus praerimosus Peck n. n. [A. tabularis Pk.] N. Y. State Mus. Bull. 94 (Botany 8):36. July 1905.

Agaricus pusillus Pk. non Pers., *syn. of A. micromegathus q. v.*

Agaricus sphaerosporus Pk. non Kromb., *syn. of A. pilosporus q. v.*

Agaricus tabularis Pk. non Pers., *syn. of A. Praerimosus q. v.*

Amanita lignophila Atks. ined. N. Y. State Mus. Bull. 94 (Botany 8):19. July 1905.

Amerosporium dolochi Ell. syn. of A. oeconomicum. [Farber.] Bib. Tales N. A. F. 1^1:211. 1 Sept. 1905.

Ampelopsis quinquefolia (?), host to Plowrightia neo-mexicana Earle n. sp. Bull. N. P. Bot. Gar. 3:(291). 30 June 1904.

Amphispores of the grass and sedge Rusts. Joseph Charles Arthur. Bull. Torr. Bot. Club, 32:35-41. Jan. 1905.

Andira inermis, host to Meliola andirae Earle n. sp. Bull. N. Y. Bot. Gar. 3:(303). 30 June 1904.

Antennaria semiovata B. & Br., *syn. of Antennularia semiovata q. v.*

Antennatula arctica Rostr., *syn. of Antennularia arctica q. v.*

Antennaria elaeophila Mont., *syn. of Antennularia elaeophila q. v.*

ANTENNARIA rectangularis Sacc., *syn. of Antennularia rectangularis q. v.*

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ASTRELLA erithalidis E. & E., *syn. of Asterina erithelidis q. v.*

ASTRELLA prosopidis E. & E., *syn. of Asterina prosopidis q. v.*

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AURICULARIA tenuis (Lev.) Farlow n. n. [Exidia tenuis Lev.] Bib. Index N. A. F. 1^1:309. 1 Sept. 1905.

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BOLETUS nobilis Peck n. sp. N. Y. State Mus. Bull. 94 (Botany 8):48. July 1905.

(*To be Continued.*)

Correction.— Plate 77 represents Clitopilus abortivus instead of C. orcella. The two lower figures of Plate 76 represent Clitopilus orcella instead of C. abortivus. This correction is suggested by the author of the article to the editor who inadvertantly made the error.

JOURNAL OF MYCOLOGY

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EDITOR'S NOTES.

Some kindly inquiries have come from subscribers relative to this much belated Number of the JOURNAL. It avails nothing to say that the pressure of other duties which interferes with prompt issuance is exceedingly regretted; but all may be assured that the promised six Numbers of the current Volume will be sent out, even if tardy, before the year closes. The September number will be distributed in November.

The report of the Proceedings of the Vienna Congress shows a rather advanced position along some of the botanical lines—though the views of most European botanists seem to nearly all Americans entirely too conservative. However, we see abundant cause for congratulation. That nothing was done especially or exclusively in the interest of mycology was to be expected; yet some of the principles adopted pertain as well to this as to other branches of Botany. Five years hence when this subject receives its promised attention something may be doing.

The rule adopted by the Vienna Congress to the effect that all technical descriptions of new species shall be in Latin diagnosis is to be most highly commended—nor is there need of delay in the inauguration of the scheme until 1908.

"So far so good." This we say with Professor Earle who adds (in Science), also the following sound doctrine: "The failure to recognize the basic principle of generic types and the absurd recommendation to make exceptions from the rules adopted in case of over four hundred generic names, makes it morally certain that these rules will not be final and will not settle the vexed question of nomenclature.

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P. Dietel.

Journal of Mycology. Portraits with Facsimile Autographs.

Journal of Mycology

VOLUME 11—SEPTEMBER 1905

TABLE OF CONTENTS

NORTH AMERICAN SPECIES OF MARASMIUS.

A. P. MORGAN.

MARASMIUS FRIES. GEN. HYM. 1836.

Fungi tough and flexible, drying up and more or less persistent, not putrescent, reviving when moistened. Hymenophore continuous with the stipe but heterogenous, descending into the trama; veil none. Stipe cartilaginous or horny. Lamellae tough and flexible, subdistant, the edge acute and entire; spores white.

Agarics small or minute, growing for the most part upon wood or among the old leaves in woods; they are easily dried in good shape and make elegant specimens for the herbarium. The species are numerous, especially abounding in the forests of tropical regions. Saccardo in the several volumes of the Sylloge enumerates and describes more than five hundred species.

The following is an attempt at an orderly arrangement of the species thus far enumerated in North America including the West India Islands. It is only an endeavor to get together the scattered species so that some critical study of them may be made; hence the descriptions of the different authors are given as written and there is no indication of the synonyms which undoubtedly occur to some extent.

§ 1. *COLLYBIA.—PILEUS TOUGH-FLESHY AT LENGTH SUBCORIACEOUS, COMMONLY SULCATE OR RUGULOSE, THE MARGIN AT FIRST INVOLUTE. STIPE SUBCARTILAGINOUS. LAMELLAE ADNATE OR NEARLY FREE.*

I. SCORTEI. *Stipe solid or medullate-stuffed, then hollow, fibrous within, externally a detersile villosity clothing the cartilaginous cuticle. Lamellae seceding-free.*

A. *STIPE WOOLLY OR STRIGOSE AT THE BASE.*

a. *Lamellae subdistant.*

1. MARASMIUS URENS Fries. Hym. Eur., *Agaricus urens* Bulliard, Herb, 1790.

Taste acrid. Pileus fleshy then coriaceous, convex-explanate, glabrous, even, at length wrinkled or rivulose. Stipe fibrous, solid, rigid, pallescent, mealy with white flocci and white-villous at the base. Lamellae free, joined together behind, pale or yellowish changing to brownish, at length remote, distant, firm; spores elliptic-oblong, 8 x 4 mic.

Growing among old leaves in woods. Pileus 3-5 cm. in diameter, alutaceous to reddish-umber, paler when dry; stipe 9-12 cm. long, 3-4 mm. thick.

2. MARASMIUS SUBNUDUS Ellis. Peck, 51. N. Y. Rep. 1897.

Taste bitter. Pileus submembranaceous, broadly convex or nearly plane, glabrous, the margin striate. Stipe solid, equal, reddish-brown above, darker below, everywhere clothed with a grayish down or tomentum, which is denser near the base. Lamellae narrow, subdistant, nearly free, whitish or cream color.

Growing on old leaves and sticks in woods. Pileus 2-4 cm. in diameter, dull brownish-red or dingy bay; stipe 4-8 cm. long, 2-3 mm. thick.

3. MARASMIUS COPELANDI Peck. Bull. Torr. Bot. Club. 1904.

Taste and odor strong and unpleasant. Pileus thin, soft, broadly convex, glabrous, tawny. Stipe slender, soft, hollow, downwardly velvety-pubescent. Lamellae few, unequal, distant, adnate, pallid; spores subfusoid, more acute at one apex, 12-15 x 4 mic.

On dead leaves of Quercus densiflora; California. Pileus 1-2 cm. broad; the stipe 4-6 cm. long, 1-2 mm. thick.

4. MARASMIUS SCABELLUS. Agaricus Scabellus A. & S. Consp. Fung. 1805. *Agaricus stipitarius* Fries, Syst. Myc. I. 1821.

Pileus a little fleshy, convex-plane, umbilicate, velvety-scaly or brown-fibrillose. Stipe stuffed becoming fistulose, tough, brownish, hirsute-fibrillose. Lamellae seceding-free, ventricose, subdistant, white.

Growing on sticks and old leaves in open woods. Pileus 6-10 mm. in diameter, the stipe 3-7 cm. long and 1-2 mm. thick. This species of Collybia is constantly taken for a Marasmius.

5. MARASMIUS UMBONATUS PECK 25TH N. Y. REP. 1872.

Pileus thin, tough, expanded, umbonate, glabrous, even or substriate, alutaceous. Stipe solid, equal, tawny below, paler above, velvety-tomentose. Lamellae narrow, subdistant, reaching the stipe, venose, connected, sometimes branched, white.

Growing on the ground under balsam trees. Pileus 1-2 cm. in diameter; the stipe 2.5-4.0 cm. in length and 1 mm. thick.

6. MARASMIUS ACERINUS PECK, N. Y. REP. 1898.

Pileus thin, submembranaceous, convex, umbilicate, subglabrous, sulcate-striate, pale bay red. Stipe short, often curved, hollow, clothed with minute whitish pubescence, colored like the pileus or sometimes a little darker. Lamellae broad, distant, adnate, white or yellowish; spores subelliptic, 7-8 x 4 mic., obliquely apiculate at one end.

Growing on old bark of Acer spicatum. Pileus 6-12 mm. broad; the stipe 1-2 cm. long, 1-2 mm. thick. The stipe is thinly clothed with minute short whitish hairs, which appear to some extent on the pileus.

7. MARASMIUS VITICOLA B. & C. ANN. & MAG. N. H. OCT. 1859.

Pileus thin, subcoriaceous, depressed, sulcate-striate, pale rufous. Stipe short, dark brown, pruinose-furfuraceous. Lamellae ventricose, moderately broad, slightly adnate, distant, pallid, the interstices even.

Growing on dead vine branches; Alabama. Pileus 2 cm. in diameter; the stipe 2.5 cm. in height.

b. Lamellae rather close.

8. MARASMIUS SPONGIOSUS B. & C. JOURN. BOT. 1849.

Pileus plane, whitish-brown, the center darker, obtuse. Stipe furfuraceous-pulverulent; the base thickened, spongy, tawny-villous. Lamellae broad, whitish, rather close, slightly adnate; spores elliptic, obliquely apiculate, 7-9 x 3-4 mic.

Growing in rich soil around old stumps, etc. Pileus 1-2 cm. in diameter, the stipe 3-5 cm. long, and 1-2 cm. thick above the rooting base, sometimes much thicker.

9. MARASMIUS RIGIDUS MONTAGNE SYLL. CRYPT. 1856.

Pileus a little fleshy, convex, umbonate then explanate, at length cyathiform-reflexed, glabrous, purplish, brown when dry, the margin striate. Stipe cartilaginous, bay, fistulous, everywhere clothed by a pale villosity, the base thickened and spongy-floccose. Lamellae close, narrow, attenuate-attached behind, white, pale cervine when dry.

Growing on old wood and fallen leaves of Oak. Pileus 2 cm. in diameter, the stipe 5 cm. long and 1-2 mm. thick. The "globose" spores are negligible.

10. MARASMIUS PERONATUS FRIES. HYM. EUR., *Agaricus peronatus* BOLTON FUNG. 1788.

Taste acrid. Pileus convex or nearly plane, fleshy-membranaceous, reddish-pallescent; rugulose. Stipe fibrous stuffed, subtomentose, downward yellow-strigose. Lamellae rather broad, rufescent or pallid, seceding-free; spores elliptic ovoid, hyaline, 10 x 6-7 mic.

Growing among old leaves in woods. Pileus 2-4 cm. in diameter, the stipe 5-7 cm. long, 3-4 mm thick. The dense yellow strigae at the base of the stipe appear to constitute the distinguishing character.

11. MARASMIUS SULPHUREUS JOHNSON, BULL. MINN. ACAD. 1878.

Pileus red-brown, expanded, the margin wrinkled, the umbo darker colored. Stipe sulphur-colored, tomentose, equal, fistulous, incurved, bulbous at the base. Lamellae numerous, entire dimidiate, adnate, subdecurrent, venose-connected, pale orange.

12. MARASMIUS LANATUS, *Agaricus lanatus* SCHUMACHER, EN. PLANT. 1803.

Pileus fleshy-membranaceous, subhemisphaeric, bay, the margin brownish. Stipe rather short, subclavate, dilute umber, fleshy fibrous, whitish-woolly at the base. Lamellae rather broad, behind subrotundate, to the apex of the stipe dilated-adnate, umber-brown, the margin paler.

Growing among the fallen leaves in Beech woods. Pileus 4-5 cm. in diameter, the stipe 5-6 cm. long and nearly 4 mm. thick.

13. MARASMIUS FAGINEUS MORGAN, MYC. FLORA M. V.

Pileus a little fleshy, convex then plane or depressed, at length somewhat repand, rugose-striate. Stipe short, hollow, pubescent, thickened upward, the base somewhat tuberculose. Lamellae short-adnate, somewhat crisped, close, pale reddish.

Growing over the bark at the base of living beech trees. Pileus 2-4 cm. in diameter, the stipe 1-3 cm. long. Pileus reddish-pallid or alutaceous, the stipe concolorous, the lamellae rather paler.

14. MARASMIUS BIFORMIS PECK, N. Y. REP. 1902.

Pileus thin submembranaceous, campanulate or nearly plane, generally umbilicate, glabrous, bay-red or pale brown, rugosely striate. Stipe slender, stuffed or hollow, clothed with a dense

pubescence. Lamellae rather close, adnate, grayish tinged with creamy-yellow.

Growing on the ground among the leaves of coniferous woods. Pileus 8-16 mm. in diameter, the stipe about 25 mm. long and 1 mm. thick.

B. *STIPE NAKED AT THE BASE OFTEN COMPOSED OF TWISTED FIBRES.*

15. MARASMIUS OREADES FRIES HYM. EUR. AGARICUS OREADES BOLTON FUNG. 1788

Somewhat fragrant. Pileus fleshy, tough, convex, then plane, subumbonate, glabrous expallent. Stipe solid, equal, corticate by a villose interwoven cuticle, pallid, the base naked. Lamellae free, broad, distant, whitish; spores elliptic, hyaline, 7-9 x 4-6 mic.

Growing in grassy places in open woods, pastures, etc. Pileus 3-5 cm. in diameter, the stipe 6-9 cm. in length and 3-4 mm. thick.

16. MARASMIUS PLANCUS FRIES HYM. EUR.

Taste mild. Pileus fleshy-tough, plano-depressed, obtuse, even, expallent. Stipe hollow, soon compressed, with a cortex of white hairs, the bast tapering somewhat and naked . Lamellae seceding free, distant, linear, darker-colored.

Growing in woods and shady places. Pileus 2-3 cm. in diameter, the stipe 4-5 cm. long. Closely related to M. oreades.

17. MARASMIUS FIBROSIPES B. & C. FUNGI CUB. No. 89. 1867.

Pileus depressed, subcoriaceous, thin, glabrous, whitish. Stipe rather thick, fibrous-scaly, solid, white, fuscescent. Lamellae close, narrow, free, rounded behind and remote.

Growing on dead wood. Pileus 3-4 cm. in diameter, the stipe 2-3 cm. long and 3-4 mm. thick.

18. MARASMIUS STRIATIPES PECK 24 N. Y. REP. 1871.

Pileus convex, glabrous, even, pale alutaceous. Stipe equal or slightly thickened at the base, firm, hollow, distinctly striate, pruinose-tomentose, whitish with an abundant white mycelium. Lamellae rather broad, subdistant, rounded behind, attached, white.

Growing on the ground among old leaves in woods. Pileus 4-5 cm. in diameter, the stipe 5-10 cm. high and 4-6 mm. thick

II. TERGINI. *Stipe rotting, definitely tubular, not fibrous but manifestly cartilaginous. Lamellae seceding-free. Pileus thinner than those of the former, hygrophanous.*

A. *STIPE WOOLLY BELOW OR AT THE BASE, GLABROUS ABOVE.*

a. Pileus even or only rugulose.

19. MARASMIUS FUSCO-PURPUREUS FRIES HYM. EUR. AGARICUS FUSCO-PURPUREUS PERSOON ICONES 1799.

Inodorous. Pileus a little fleshy, convexo-plane, somewhat umbilicate, dark purple, expallent. Stipe fistulous, glabrous, dark purple, the base reddish-strigose. Lamellae annulate-attached, at length free, distant, rufescent; spores 8-10 x 4 mic.

Growing among old leaves in beech woods. Pileus 2-3 cm. in diameter, the stipe 5-8 cm. long and 3-4 thick.

20. MARASMIUS PRASIOSMUS FRIES HYM. EUR.

Strong-smelling. Pileus submembranaceous, tough, campanulate-convex, then explanate, obtuse rugulose. Stipe fistulous, pallid above, glabrate, thickened downward, pallid then rufous or fuscous, subtomentose. Lamellae attached, rather close, white; spores elliptic-ovoid, hyaline, 14-15 x 7 mic.

Growing upon the old leaves in oak woods. Pileus 1-2 cm. in diameter, the stipe 5-8 cm. long and 2 cm. thick. Odor strong and persistent. Pileus whitish darkened on the disk.

21. MARASMIUS DELECTANS MORGAN SP. NOV.

Pileus subcoriaceous, convex then expanded and depressed glabrous, rugulose, white changing in drying to pale alutaceous. Stipe long, slender, tapering slightly upward, glabrous, brown and shining, white at the apex, arising from an abundant white-floccose mycelium. Lamellae moderately broad, unequal, rather distant, trabeculate between, white emarginate adnexed; spores lance-oblong, hyaline, 7-9 x 4 mic.

Growing on old leaves in deciduous woods. Pileus 1-2 cm. in diameter, the stipe 3-5 cm. long and 1.0-1.5 mm. thick.

22. MARASMIUS SEMIHIRTIPES PECK 25 N. Y. REP. 1872.

Pileus thin, tough, nearly plane or depressed, glabrous, sometimes striate on the margin, reddish-brown, becoming alutaceous, the disk sometimes darker. Stipe equal, even or finely striate, tubular, glabrous above, velvety-tomentose toward the base, reddish-brown. Lamellae subdistant, reaching the stipe, white.

Growing on the ground among fallen twigs and leaves. Pileus 1-2 cm. in diameter, the stipe 3-5 cm. long and 1 mm. thick.

b. Pileus striate or plicate-sulcate.

23. MARASMIUS SEMISQUARROSUS B. & COOKE, GREVILLEA VI, 129. Pileus a little fleshy, convex then plane, obtuse, whitish, the margin striate. Stipe tubular, bay brown, glabrous above and substriate, below floccose-squarrose and slightly thickened. Lamellae adnexed, rather close, whitish.

Growing among fallen leaves. Pileus 1-2 cm. in diameter, the stipe 5-8 cm. long, squarrose one-third the distance from the base.

24. MARASMIUS BOMBYCIRHIZA B. & COOKE, GREVILLEA VI, 129.

Pileus membranaceous, somewhat convex, pallid, the margin striate. Stipe fistulous, whitish, glabrous above, below elongated, rooting, white, floccose. Lamellae adnate, white.

Growing on fallen cones of Magnolia grandiflora. Pileus 6-8 mm. in dimaeter, the stipe 5-8 cm. long, of which the lower half is rooting and clad with white cottony fibrils.

25. MARASMIUS PLICATULUS PECK BULL. TORR. BOT. CLUB. 1897.

Pileus submembraneous, convex or subcampanulate, glabrous, usually sulcate-striate, pale brown or vinous red. Stipe slender, tubular, glabrous above, shining, blackish-brown, red at the apex, the base covered with abundant whitish hairs or down. Lamellae subdistant, narrowed behind, attached, whitish, spores elliptic-ovoid, hyaline, 10-13 x 5-7 mic.

Growing among fallen leaves; California. Pileus 2-3 cm. in diameter, the stipe 7-13 cm. long and about 3 mm. thick.

26. MARASMIUS BELLIPES MORGAN SP. NOV.

Pileus thin, a little fleshy, campanulate then expanded, glabrous, plicate-sulcate, pale pinkish to purplish. Stipe long, slender, thicker upward, glabrous, brown and shining below, the summit purplish, arising from an abundant white mycelium. Lamellae moderately broad, equal, rather distant, white, approximate; spores lanceolate, hyaline, 10-12 x 3-4 mic.

Growing on old leaves of deciduous trees. Pileus 1.5-2.5 cm. in diameter, the stipe 4-6 cm. long and 1 mm. thick.

B. *STIPE, AT LEAST WHEN DRY, EVERYWHERE PRUINATE-VELVETY.*

a. Pileus even or only rugulose.

27. MARASMIUS ERYTHROPUS FRIES HYM. EUR. ICONES T. 174. AGARICUS ERYTHROPUS PERSOON SYNOPSIS 1801.

Inodorous. Pileus a little fleshy, convexo-plane, obtuse, even, pallescent, afterward rugose. Stipe fistulous, striate, glabrous, dark reddish, by dryness subpruinose, the base white-strigose. Lamellae seceding-free, broad, lax, venose-connected entire, whitish; spores lanceolate, 7-9 x 3-4 mic.

In beech woods among the old leaves and on the trunks. Pileus 2-3 cm. in diameter, the stipe 5-8 cm. long and 2-3 mm. thick.

28. MARASMIUS SULLIVANTII MONT. SYLL. CRYPT. 446.

Pileus fleshy-membranaceous, convex, saffron-red, the disk even and subumbilicate, the margin striatulate. Stipe cartilaginous, fistulous, equal, brown, pruinose, beneath the pruina shining, the base scantily white-strigose. Lamellae free, rather thick, unequal, white or pallid; spores white, spheric (?) 10 mic. in diameter.

Growing on the ground among mosses. Pileus 2 cm. in diameter.

29. MARASMIUS ARCHYROPUS FRIES HYM. EUR. AGARICUS ARCHYROPUS PERSOON MYC. EUR. 1828.

Inodorous. Pileus a little fleshy, convex then plane or depressed, glabrous, pallescent. Stipe stuffed becoming hollow, rigid, straight, beneath the white tomentose down pale rufescent. Lamellae attached seceding close, linear, pallid; spores 8-10 x 3-4 mic.

Fasciculate-caespitose, growing among old oak leaves. Pileus 2.5 cm. in diameter the stipe 8-10 cm. long and about 2 mm. thick.

30. MARASMIUS ANOMALUS PECK 24 N. Y. REP. 1871.

Pileus thin, convex, glabrous, reddish-gray. Stipe equal, hollow, glabrous or slightly pruinose, pallid, reddish-brown at the base. Lamellae close, narrow, rounded behind and uinted together, free, whitish or pallid.

Growing on sticks among leaves in woods. Pileus 1-2.5 cm. in diameter, the stipe 3-5 cm. in height, 2 mm. thick.

31. MARASMIUS SUBTOMENTOSUS PECK, BULL. TORR. BOT. CLUB. 1895.

Pileus thin, subcampanulate, at length convex or nearly plane, minutely tomentose-pubescent, gray or reddish, the margin scarcely striate. Stipe nearly equal, silky-tomentose, grayish or brownish. Lamellae broad, subdistant, free or scarcely attached, ventricose, concolorous; spores 10-13 x 5-7 mic.

Growing on the roots of grasses in sandy places; Kansas. Pileus 1-2 cm. in diameter, the stipe 2-2.5 cm. long and 2 mm. thick.

32. MARASMIUS POLYPHYLLUS PECK 51 N. Y. REP. 1897.

Odor and taste alliaceous. Pileus fleshy, thin, convex or nearly plane, even, whitish to pale reddish, often darker on the disk. Stipe equal, hollow, reddish-brown, clothed with a whitish down or tomentum, which is commonly more abundant toward the base. Lamellae very numerous, narrow, crowded, adnexed or almost free, white; spores minute elliptic, 5-6 x 3-4 mic.

Growing on damp ground in shaded places. Pileus 3-5 cm. in diameter, the stipe 4-8 cm. long and 2-4 mm. thick.

b. Pileus striate or plicate-sulcate.

33. MARASMIUS BADIUS B. & C. FUNGI CUB, 92.

Pileus convex, striate, glabrous. Stipe thickened above and below, pruinose, glabrescent. Lamellae ventricose, distant, rounded behind and slightly adnate, thick.

Growing on bark amongst moss. Pileus 1-2 cm. in diameter, the stipe 2-3 cm. long and 2 mm. thick.

34. MARASMIUS PERSONATUS B. & C. FUNGI CUB. 119.

Pileus depressed, striate, pale, tawny. Stipe rigid, glabrescent, sulcate when dry, attached by an orbicular strigose base, concolorous. Lamellae close, adnexed.

Growing on old leaves. Pileus 6-7 mm. in diameter, the stipe 4 cm. long.

35. MARASMIUS VELUTIPES B. & C. ANN. & MAG. N. H. 1859.

Pileus thin, umbilicate, brown or ochre-brown, the margin striate. Stipe straight, clothed with pale velvety down, ferruginous at the base. Lamellae narrow, close, pallid, attached.

Growing on old leaves in dried up places in swamps. The pileus 1-2 cm. in diameter, the stipe 4-5 cm. long and 2 mm. thick.

36. MARASMIUS SUBPILOSUS PECK, BULL. TORR. BOT. CLUB. 1903.

Pileus thin, even or the center rugulose and the margin striate, pruinose-pubescent, convex or nearly plane, whitish, the center often brown tinged with yellow. Stipe slender, stuffed or hollow, pruinose-pubescent, the base gray-tomentose, reddish-brown, white above. Lamellae rather broad, ventricose, adnate, subsinuate, white, the edge minutely ciliate.

Growing among leaves and branchlets in wet woods; Idaho. Pileus 1-2 cm. in diameter, the stipe 3-5 cm. long and 1 mm. thick.

37. MARASMIUS PAPILLOSUS CLEMENTS, BOT. SURVEY IV. 1896.

Pileus conic-papillate, then campanulate or explanate, membranaceous, striate, glabrous, whitish or ochraceous. Stipe equal, whitish, pruinose above, below densely woolly. Lamellae few, attached, white; spores ellipsoid, 6 x 4 mic.

Growing on rotten wood. Pileus 7-15 mm. in diameter, the stipe 15-25 mm. long and 2 mm. thick.

III. STYLOBATAE. *Pileus convex-involute, then plane and depressed. Stipe cartilaginous without a root, dilated at the*

base into a circular disk or floccose tubercle. Lamellae adnate. Growing on old wood, branchlets, sticks, etc.

A. STIPE GLABROUS.

a. Lamellae colored.

38. MARASMIUS RHYSSOPHYLLUS MONT. B. & C FUNGI CUB. 1867.

Pileus appressed-fibrous, becoming glabrous, whitish or pal yellow. Stipe concolorous, glabrous, the base strigose. Lamella distant, yellow, trabeculate between.

Growing on old sticks in thick woods. Pileus 2-3 cm. i diameter, the stipe 2-3 cm. long and 2 mm. thick.

39. MARASMIUS SUBGLOBOSUS B. & C. FUNGI CU 1867.

Pileus subglobose or hemispheric, yellow. Stipe glabrou sulcate, dilated at the base. Lamellae broad, adnate, concolorou

Growing on sticks in woods. Pileus 3-4 mm. in diamete the stipe 6-7 mm. long. There is a variety three times as larg

40. MARASMIUS CUCULLATUS ELLIS, BULL. TOR BOT. CLUB. 1876.

Pileus thin campanulate, the margin sulcate-striate. Sti slender, the base thinly clad by a whitish tomentum, otherwise pa straw-color. Lamellae few, distant, unequal, adnate, paler th the pileus.

Growing on dead branches of Vaccinium. Pileus about cm. in diameter, the stipe 5-10 mm. long.

41. MARASMIUS CORRUGATUS PAT. SACCARDO, SY LOGE XVI, 54.

Pileus fleshy-membranaceous, convex, glabrous, brown, t disk rugulose, the margin even. Stipe cylindric, rufous-bla paler above, the base dilated. Lamellae crowded, unequal, faw adnate.

Growing on rotten wood. Pileus 1-2 cm. in diameter, stipe 2-3 cm. long and 1 mm. thick.

b. Lamellae white or pallid.

42. MARASMIUS STYLOBATES B. & C. FUNGI C No. 109, 1867.

Wholly white. Pileus thin, glabrous, convex then plane, margin sulcate. Stipe hollow, glabrous, arising from an orbic base. Lamellae broad, distant, free.

Growing on rotten wood. Pileus about 4 mm. in diame the stipe 1-2 cm. long.

43. MARASMIUS COILOBASIS BERK., JOURN. 1856.

Wholly white. Pileus convex, membranaceous. Stipe

brous arising from an orbicular disk. Lamellae narrow, linear, the spaces between venose.

Growing on dead trunks. Pileus 2-3 cm. in diameter, the stipe 2-3 cm. long, scarcely 1 mm. thick.

44. MARASMIUS CATERVATUS MASSEE, JOURN. BOT. 1892.

Pileus membranaceous, convex or campanulate then expanded, even, becoming striate, whitish. Stipe fistulous, equal, white, glabrous, the base mycelio-thickened. Lamellae adnate, distant, white then pallid; spores ellipsoid, 6 x 4 mic.

Growing on dead wood; West Indies. Pileus about 8 mm. in diameter, the stipe 12-16 mm. long and 1 mm. thick.

B. STIPE VELVETY OR PRUINOSE.

a. Lamellae colored.

45. MARASMIUS SERICIPES B. & C. FUNGI CUB. 96.

Vinoso-rufous when dry. Pileus convex, thin rugose. Stipe rather thick, silky, glabrescent. Lamellae distant, narrow adnate.

Growing on dead sticks in woods. Pileus 2 cm. in diameter, the stipe 2-3 cm. long and 2-4 mm. thick.

46. MARASMIUS DICHROUS B. & C. ANN. & MAG. N. H. XII. 426.

Pileus convex, dark brown, minutely tomentose, sometimes appearing velvety. Stipe brown; furfuraceous, villous-enlarged at the base. Lamellae moderately distant, ventricose adnate-seceding; interstices nearly even; spores white.

Growing on rotten wood in dry swamps. Pileus 2-3 cm. in diameter, the stipe 3-4 cm. long and scarcely 2 mm. thick.

b. Lamellae white or pallid.

47. MARASMIUS RUGULOSUS B. & C. FUNGI CUB. 1867.

Pileus hemispheric, multi-sulcate, glabrous, brown or blackish, the umbo depressed and darker. Stipe brown or blackish, sparsely pubescent. Lamellae adnate, ventricose, whitish.

Growing on sticks and leaves. Allied to *M. foetidus.*

48. MARASMIUS RAMEALIS FRIES. HYM. EUR. *Agaricus ramealis.* BULLIARD HERB. 1786.

Pileus a little fleshy, plane or depressed, obtuse, not striate, rugulose, opaque. Stipe stuffed, short, farinaceous, white, downward rufescent. Lamellae adnate, subdistant, narrow, white; spores elliptic, 4 x 2 mic.

Growing on dry branches of Quercus, Fagus, Rubus, etc., often densely gregarious. Pileus 5-8 mm. in diameter, the stipe 6-10 mm. long and about 1 mm. thick. Pileus white, the disk subrufescent. In its young state the base dilated into a circular disk.

49. MARASMIUS PRAEACUTUS ELLIS, BULL. TORR. BOT. CLUB. 1876.

Very minutely pulverulent. Pileus membranaceous, convex then explanate, sub-umbilicate, faintly sulcate-striate, white, the disk rufescent. Stipe stuffed then hollow, reddish-brown, the base whitish. Lamellae close, white, rather narrow, unequal, some of them forked, adnate.

Growing on dead trunks of Citrus and Alnus. Pileus 6-7 mm. in diameter, the stipe 2-3 cm. long.

50. MARASMIUS CANDIDUS FRIES. HYM. EUR. *Agaricus candidus.* BOLTON FUNG.

All white. Pileus submembranaceous, hemispheric then plane and depressed, pellucid, naked, at length sulcate-rugulose. Stipe stuffed, slender, incurved, slightly pruinose, at the base floccose and at length brownish. Lamellae adnexed, ventricose, distant, spores elliptic, 4 x 2 mic.

Growing on sticks, branches, needles of Pine, etc. Pileus 4-8 mm. in diameter, the stipe 6-10 mm. long and about 1 mm. thick.

51. MARASMIUS CONCINNUS E. & E. PROC. AC. NAT. SC. 1893.

Pileus convex, smoky-brown, pruinose. Stipe white, arising caespitosely from a white tomentum, below hairy-strigose, tapering upward and pruinose-pubescent. Lamellae not close, adnate, pruinose, the edge obtuse; spores globose, hyaline 3 mic. in diameter.

Growing on dead wood of Euonymus. A minute species; the pileus 1 mm. in diameter, the stipe 2 mm. long.

(*To be continued.*)

THE AMANITAS OF SWEDEN.

H. C. BEARDSLEE.

During the past summer it was the privilege of the writer to spend two months in the vicinity of Stockholm, studying the fungous flora of that region. The folloiwng notes are intended to outline some of the impressions of an American mycologist, gained from a study of the Amanitas with which Fries and his associates were familiar, with the hope that they may prove to be of interest to other American students of this genus, and serve as a slight contribution to a correct understanding of our own species.

The Amanitas which were observed included nine species, viz.: A. verna, muscaria, pantherina, spissa, rubescens, porphyria, mappa, strangulata, and vaginata. A. muscaria and rubescens and Amanitopsis vaginata need little comment.

AMANITA MUSCARIA.

A. muscaria, it may be said, was found occurring in two distinct forms. The common and typical form is much more brilliant than the plant commonly found in America. It is large and robust, with the pileus as much as ten inches in diameter, and is at first a brilliant red, not orange, with which the white warts of the pileus contrast finely. In this form it seemed to me the most striking and beautiful of the fungi observed. In Maine I have collected specimens with colors nearly as bright and stature fully as large, but for the most part our Americn plant seems to tend more to orange or yellow than to red, and is much less striking in appearance. The other Swedish form is very modest in its coloration, being umber or even gray, but differs in no other way from the type. The spores were as in our American plant.

AMANITA RUBESCENS.

A. rubescens Pers. was our familiar friend in color, stature, habit, and spores, and was as abundant as it is on Long Island, while Amanitopsis vaginata Bull. was identical with our plant and presented the same variations in color and stature.

AMANITA STRANGULATA AND VAGINATA.

Of the remaining species several were of great interest, and were observed with great care through the summer. The first of these to appear was A. strangulata Fr. I had felt very anxious to find this species, and as it happened, was well located to observe it, as one island in the Park at Drottningholm where we were located seemed to be a peculiarly favorable station, where it could be seen in large numbers throughout the summer. The status of this species has been doubtful to American students for several reasons. Fries himself, evidently did not have a clear conception of it when he wrote the first edition of his Epicrisis, for he placed it with A. solitaria, described it as having a thin pileus, a circumscissile free volva, and an entire distant annulus. He stated also that it is plainly analogous to A. verna, and that he had observed only one plant, growing on an ant hill. Later he seems to describe an entirely different plant, placing it in Amanitopsis and comparing it with A. vaginata, from which he makes it differ in its larger size, its warty pileus, and in the character of its volva and annulus. He gives also a very good figure in the main.

As we observed the plant it corresponds well to Fries' later description, and to his figure. At Drottingholm it is a very robust plant, easily exceeding all the other species in size. One specimen was observed which had the pileus 12 in. in diameter, the stipe nearly fourteen inches high and two inches thick. From these dimensions it varied all the way to the size of our forms of A. vaginata. In the park it was very conspicuous, the huge pilei,

held aloft above the grass, were visible for a considerable distance, making it easily the most striking of the fungi observed.

The doubt which has existed in the United States in regard to this species has rested largely upon three things. Fries' figure seems to indicate a stipe with a curious enlargement or in some cases two enlargements near the base. His references to a "false annulus" have been difficult to understand, and doubt has also existed in regard to the character of the spores.

Continued observation made it clear what was meant by both the figure and description.

In his description he speaks of its having a false annulus "resembling the false annulus of A. vaginata, but not like it enclosed in the volva." Those who have examined A. vaginata closely will be able to understand this reference. In this species the stipe is often clothed with a soft flocculose coat, and if such plants are examined in their early stages, just as the pileus is breaking through the volva, it will be found that within the volva there is a curious raised zone where the pileus clasped the stipe, reminding one somewhat of the annulus of Coprinus atramentarius. This seems to be particularly marked in rainy weather. This enlargement soon disappears and is not always to be found. Those who have observed this feature of A. vaginata will readily understand the meaning of Fries' figure and description. The enlargements figured at the base of the stipe in A. strangulata are not enlargements of the stipe proper, but are rather, poor representations of the "false annulus." They may be observed in A. strangulata at times, though seldom in the perfection of the figure. In fact they seem to be rather accidental, than essential. In the study of the American plant little weight need therefore be given to this particular feature of Fries' plant. The spores were found to be globose 12 x 14 mic. in diameter.

There seemed little doubt after continued study of the Swedish plant that the forms found by Peck in New York and by the writer in West Virginia and referred to A. strangulata Fr. have been correctly referred. The American plant seems to be less robust than its Swedish relatives, but it does not differ in any essential point.

Amanitopsis strangulata is certainly close to A. vaginata, but it seems to be sufficiently distinct to be entitled to recognition. It is at least better marked than many recognized species.

AMANITA SPISSA.

Amanita spissa Fr. is different from anything I have observed in America. It is much like A. rubescens in its stature and color, and has the pileus covered with the closely attached fragments of the volva, and the solid stipe somewhat marginate bulbous. Cooke's figure is fairly good. It does not have the characteristic

red stains of A. rubescens which at once distinguishes it from that species. The spores were found to be 10-12 by 7-8 mic.

AMANITA PORPHYRIA.

A. porphyria Fr. is close in appearance to forms of A. phalloides, and would be referred to that species unless closely examined. The annulus is however a peculiar sooty gray externally and in collapsing forms a fuliginous ring on the stipe which is the most characteristic mark of the species. It was found in dense pine woods, and was rather common.

AMANITA MAPPA.

A. mappa Fr. is a late species and was found but once, the last week in August. It is said to be more common late in the fall. It is identical with the American plant as it occurs at Asheville, so that no doubt need be entertained as to its occurrence with us. The stipe is strongly bulbous and the thick volva breaks in a regular circumscissile manner, leaving a thick sheath on the base of the bulb with a strongly marked margin much as in A. pantherina, and forming thick felty warts on the pileus. The plants observed were all pale lemon yellow. The spores were 9-11 mic. and globose in form. Karsten speaks of them as rough, and the roughness may easily be demonstrated with a good one-fifth inch objective. It is worth noting, however, that this feature is not confined to this one species, for although it does not seem to have been commonly noticed, several species of the Amanita have spores which are distinctly spinulose.

AMANITA PANTHERINA.

A. pantherina DC. was watched with a great deal of interest. It is very common at Drottningholm and, I am told, in Sweden generally. Its closest American relative is A. cothurnata, so well figured and described by Atkinson and so abundant in the Southern Appalachians. The typical Swedish plant is very distinct and is recognized at sight. The pileus is brown or gray and its surface contrasts finely with the white warts with which it is covered. The thick persistent sheath formed upon the base of the stipe by the basal portion of the volva makes it easy to recognize.

At first sight Amanita pantherina and A. cothurnata seem to be certainly distinct, but it must be confessed that with continued observation the validity of our American species seemed very doubtful. The points of difference as they are understood by Bresadola are the smaller size, white color and especially the different spores of A. cothurnata. The size of the two species does not impress one who has seen both species growing as being particularly different. The color is different, as our plant is pure white or nearly so in its typical form, which is not true of A. pantherina. It may be said, however, that pure white forms of A. pantherina were found at Drottningholm several times during the

summer, which had they occurred at Asheville would have been taken for A. cothurnata without hesitation. The main difference therefore would seem to be in the spores. These are described in A. cothurnata as being globose or nearly so, with a large, oil globule or nucleus which nearly fills the interior of the spore. The spores of A. pantherina are elliptical. What has been confidnetly referred to A. cothurnata is very abundant at Asheville. It is in perfect agreement with figure and description except in the spore characters. Numerous examinations have been made during the past four years giving always the same results — an elliptical spore similar in size and measurements to that of A. pantherina, without an oil globule of any size. In view of the perfect agreement in other respects the difference in spore characters has been a continual puzzle. Later, in examining anew herbarium specimens, it was found that in these the spores were exactly as described. They were globose or nearly so and the cell contents had almost entirely disappeared, their place being taken by a large globule which almost entirely filled the interior of the spore. In the Asheville plant therefore the spores in the fresh plant are in accord with those of A. pantherina and the points of difference are due to secondary changes.

This view would seem the more reasonable when one considers that the presence of a large oil globule to the exclusion of the proper cell contents is abnormal in a spore. A specimen of A. pantherina which was kept for several weeks in Sweden and examined at intervals showed also the same change in its spores. Whether such a change in the spores of herbarium specimens of the Agarics often takes place, and whether it always takes place in this species, I am unable to state.

In view of these facts it seems safe to suggest that A. cothurnata may well be considered a color form of A. pantherina. I believe that this will be accepted by those who examine living specimens of both forms. In this connection it may be of value to suggest also that our A. spreta is not distinct from A. cinerea Bres. Certain points of similarity led to this belief several years ago and it has been confirmed by Bresadola, to whom specimens and photographs of A. spreta have been sent. Bresadola's description does not cover all the forms in which this variable species occurs, nor does his figure well represent it. He states, however, in a letter that his plant is exactly shown in Atkinson's figure of A. spreta. In the southern mountains this species is very abundant. During the summer it may be found in profusion in our woods and groves, vieing in abundance with A. Caesarea, which is at times our commonest species. Pure white forms are not rare and in stature all conceivable variations may be found. Some compare well with Bresadola's figure, but for the greater part they are much more robust, the extreme forms being very unlike the form which he has considered the type.

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EDITOR'S NOTES.

MUCH belated, and to avoid still greater delay by reason of incomplete copy, this number of the JOURNAL is somewhat abridged from the usual size, but all copy furnished will be taken care of in the future.

WE begin in this number the publication of Professor Morgan's paper on the North American species of Marasmius, and will resume the same in the next. The all-important work for the American mycologist is to study critically our species of Fungi. In the near future it is hoped that such studies may be found on many pages of the JOURNAL. In fact, such work, of monographic character, and the complete indexing of North American Mycology, are the two most important lines for which the JOURNAL stands. However, the Notes and articles especially prepared in the interest of beginners are much desired. With the co-operation of *many* competent mycologists this periodical can be a real *Journal* of Mycology.

A FEW specialists may possibly be discommoded by the charge to which I plead guilty of not keeping *actually up to date* with the Index to North American Mycology. Yet, after all, when insurmountable obstacles are kept in mind, I am sure of being but little criticised. My Index is useful to many, to beginners in systematic work, indispensable as a card index in well-regulated libraries; yet, for limited groups, or special purposes, the worker will in many cases of course be under the necessity of making his own peculiar index.

P. Sydow.

Journal of Mycology Portraits with Facsimile Autographs.

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a. Lamellae colored.

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53. MARASMIUS ATRO-VIRIDIS B. & C. FUNGI CUB. 100.

Pileus depressed, thin, glabrous, dark blue-green. Stipe dilated upwards, glabrous. Lamellae close, adnexed, broad, concolorous.

Growing on rotten wood in thickets. Pileus 8-9 mm. in diameter, the stipes 12-13 mm. long.

54. MARASMIUS TENEBRARUM B. & C. FUNGI CUB. 95.

Pileus convex, umbilicate, thin, radiate-striate, pale rufous, glabrous. Stipe solid, rather thick, glabrous, whitish. Lamellae close, narrow, adnate, pale brown.

Growing on sticks in woods. Pileus 8-9 mm. in diameter, the stipe 8-9 mm. long.

b. Lamellae white or pallid.

á. Pileus colored.

55. MARASMIUS PUTREDINIS B. & C. FUNGI CUB. 98.

Pileus plane, thin, glabrous, gray or rufescent. Stipe concolorous, solid, equal, glabrous. Lamellae narrow, adnate, white.

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56. MARASMIUS FLORICEPS B. & C. FUNGI CUB. 127.

Pileus conic then explanate, umbonate, sulcate, glabrous, bright red-brown. Stipe twisted, hollow, brown below, glabrous and shinning. Lamellae few, broad, white.

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57. MARASMIUS BADICEPS PECK, BULL. TORR. BOT. CLUB, 1897.

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58. MARASMIUS LEPTOPUS PECK, N. Y. REP., 1902.

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Growing on fallen leaves. Pileus 6-10 mm. in diameter, the stipe 2-4 cm. long and 1 mm. thick.

b'. Pileus white or Pallid.

59. MARASMIUS SCORODONIUS FRIES, HYM. EUR.

Strong-smelling. Pileus a little fleshy, tough, even, soon plane, rugulose and crisped. Stipe horny, fistulous, equal, glabrous, shining, rufous. Lamellae adnate, crisp, whitish; spores elliptic, 6-8 x 3-4 mic.

Growing on old wood, sticks, etc. Pileus 1-2 cm. in diameter, the stipe 2-3 cm. long and nearly 2 mm. thick; the young pileus even and rufous, soon becoming white.

60. MARASMIUS CALOPUS FRIES. HYM. EUR. AGARICUS CABOPUS PERSOON, SYNOPSIS. 1801.

Inodorous. Pileus a little fleshy, tough, convexo-plane or depressed, even at length rugose, whitish. Stipe fistulous, equal, glabrous, without a root, shining, bay-rufous. Lamellae emarginate adnexed, thin, white; spores elliptic, 7 x 4 mic.

Growing on twigs and stems in woods. Rather smaller than M. scorodonius, but with a longer stipe.

B. STIPE VELVETY OR PRUINATE.

d. Lamellae colored.

61. MARASMIUS SUBCORACINUS B. & C. FUNGI CUB. 91.

Pileus plane, rugose, coriaceous, rufescent. Stipe subvelvety, glabrescent, brown. Lamellae distant, adnate, brown.

Growing on sticks in woods.

62. MARASMIUS GLAUCOPUS PAT. IN DUSS. EN CHAMP. 1903.

Pileus campanulate-convex, plicate-sulcate, dark rufous-purple, velvety. Stipe cylindric, hollow, dark tawny-red. Lamellae broad, rather close, unequal, dark purple; spores ovoid, hyaline, 8 x 5 mic.

Growing on trunk of Chrysophyllum. Pileus 2 cm. in diamter, the stipe 3 cm. long and 3 mm. thick.

b. Lamellae white or pallid.

á. Pileus colored.

63. MARASMIUS OLNEYI B. & C. ANN. & MAG. N. H. 1859.

Pileus convex, glabrous, striate, rufescent. Stipe white, minutely, pulverulent-tomentose, insititious. Lamellae white, distant, free, forming by their junction a little collar round the top of the stipe.

Growing on dead twigs. Pileus 8-9 mm. in diameter, the stipe 3-4 cm. in length and not 2 mm. thick.

64. MARASMIUS PUSIO B. & C. ANN. & MAG. N. H. XII. 426.

Extremely small. Pileus membranaceous, slightly convex, delicately striate, pale purple-brown. Stipe very slender, whitish, obscurely tomentose or pulverulent. Lamellae moderately broad, numerous, ventricose, adnate, dirty white.

Growing on the bark of trees. Pileus scarcely more than 2 mm. in diameter, the stipe 16-20 mm. long and very slender.

65. MARASMIUS JUGLANDIS B. & C. SACCARDO, SYLLOGE IX. 67.

Pileus explanate, irregular, pale umber, glabrous, thin, flaccid. Stipe angular, hollow, compressed above, darker below, pruinose, concolorous. Lamellae unequal, adnate, watery-white, thin, flaccid; spores subglobose, 4 x 3 mic.

Growing on trunks of Juglans and Hickoria among mosses. Pileus 2 cm. in diameter, the stipe 2-3 cm. long, 2-3 mm. thick.

66. MARASMIUS GREGARIUS PECK. BULL. TORR. BOT. CLUB. 1896.

Pileus submembranaceous, glabrous, depressed or broadly umbilicate, when wet striatulate, bay or pale alutaceous, the disk darker. Stipe short, slender, hollow, flocculose or subpubescent, pale bay, toward the base darker. Lamellae narrow, subdistant, adnate, sometimes branched, whitish; spores subglobose, nearly 4 mic. in diameter.

Growing on decorticated wood; Kentucky. Pileus 10-13 mm. in diameter, the stipe 1-2 cm. long and 1 mm. thick.

b'. Pileus white or pallid.

a''. Stipe colored.

67. MARASMIUS TENERRIMUS B. & C. FUNGI CUB. 110.

Pileus convex then plane, whitish subpellucid, the center depressed, very tender, tomentose. Stipe setiform, solid, pubescent, pale brown. Lamellae broad, adnate, whitish.

Growing on rotten sticks in woods. Pileus 13 mm. in diameter, the stipe 13 mm. long, bristle-shaped.

68. MARASMIUS SALIGNUS PECK. 35 N. Y. REP. 1882.

Pileus submembranaceous, convex or plane, even, glabrous or subpruinose, whitish. Stipe short, slender, slightly mealy or pruinose, reddish-brown. Lamellae rather narrow, subdistant, adnate, whitish; spores ovoid or subelliptic, pointed at one end, 6-8 x 4 mic.

Growing on the bark of living willow trees. Pileus 4-10 mm. in diameter, the stipe 12-20 mm. long and scarcely 1 mm. thick.

69. MARASMIUS RAMULINUS PECK. N. Y. REP. 1897.

Pileus very thin, submembranaceous, broadly convex, even, becoming radiately rugulose on the margin, subumbilicate or slightly depressed in the center, white. Stipe slender, minutely downy or pruinose, whitish then rufescent. Lamellae rather close, adnate, white; the spores elliptic, 7-8 x 3-4 mic.

Growing on dead twigs, branches and herbaceous stems. Pileus 4-8 mm. in diameter, the stipe 12-18 mm. long.

b″. Stipe white or pallid.

70. MARASMIUS OPACUS B. & C. JOURN. BOT. 1849.
Delicate. Pileus convex, rugulose, opaque, pulverulent, whitish. Stipe insititious, elongated pulverulent-subfurfuraceous, pallid. Lamellae ventricose, distant, adnexed; spores ovoid-oblong, hyaline, 6-7 x 3 mic.

Growing on old leaves and sticks. Pileus 5-8 mm. in diameter, the stipe 2-4 cm. long and about 1 mm. thick.

71. MARASMIUS CUBENSIS B. & C. FUNGI CUB. 106.
Pileus plane, umbonate, thin, sulcate, rugulose, whitish. Stipe slender, whitish, pulverulent, insititious. Lamellae thin, distant, adnexed, white trabeculate between.

Growing on dead wood. Pileus 2 cm. in diameter, the stipe 2-3 cm. long.

72. MARASMIUS DEALBATUS B. & C. FUNGI CUB. 107.

Pileus convex, pure white, opaque, umbonate. Stipe pruinose, dilated upward, insititious. Lamellae close venose.

Growing on bits of grass, etc. Pileus 6-7 mm. in diameter, the stipe 12-13 mm. long.

73. MARASMIUS PETIOLORUM B. & C. FUNGI CUB. 111.

Gregarious. Pileus convex, then nearly plane, sub-pellucid, striate, pruinose. Stipe pellucid, pruinose, insititious. Lamellae few, adnate, broad, white.

Growing on petioles and midribs of old leaves. Pileus 1 mm. in diameter, the stipe 6-7 mm. long.

74. MARASMIUS BERMUDENSIS BERK. EXP. CHALL. II. 1873.
Pileus convex, pulverulent, whitish, subsulcate. Stipe short, pellucid above, downward pulverulent. Lamellae distant, adnate, white.

Growing on dead wood of Coffea: Bermuda. Pileus 2 mm. in diameter, the stipe 6-12 mm. long.

§ 2. *MYCENA. PILEUS FROM SUB-CARNOSE TO MEMBRANACEOUS, CONVEX OR CAMPANULATE, THE MARGIN AT FIRST STRAIGHT AND APPRESSED. STIPE CARTILAGINOUS, TOUGH, DRY, FISTULOUS. LAMELLAE FREE OR ADNEXED, NOT DECURRENT.*

I. LONGIPEDES. *Pileus a little fleshy or submembranaceous, convex or campanulate then expanded. Stipe elongated and rooting among old leaves or in rotten wood. Lamellae free or attached to the stipe.*

A. STIPE GLABROUS.

75. MARASMIUS COHAERENS COOKE, ILLUST. 1128 B., ATKINSON'S MUSHR. 132, *Agaricus cohaerens* Persoon, SYNOPSIS 306, FRIES. HYM. EUR.

Pileus a little fleshy, campanulate then expanded, obsoletely umbonate, velvety-soft, tawny cinnamon, expallent. Stipe horny, very rigid, even, glabrous, shining, bay, pallid above. Lamellae free, distant, very broad, subvenose-connected, white or yellowish; spores elliptic-oblong, 10-12 x 6-8 mic.

Growing on wood and among old leaves. Pileus 2-4 cm. in diameter, the stipes long, subfasciculate, bound together by white villi.

76. MARASMIUS SPINULIFER ATKINSON'S MUSHR. 132, *Agaricus spinulifer* PECK. 24 N. Y. REP. 1871.

Pileus fleshy, thin, convex, smooth hygrophanous, alutaceous tinged with pink, slightly striatulate on the margin when moist, paler when dry. Stipe slender, tough, smooth, shining, hollow, reddish-brown, paler above, with a whitish mycelium at the base. Lamellae narrow, close, rounded behind and free, pale cinnamon; spores subelliptic, 5-6 mic. long.

Caespitose. Growing on old logs and ground among leaves in woods. Pileus 2.5-4 cm. in diameter, the stipe 5-8 cm. long and 2 mm. thick. The lamellae are clothed with minute spines or setae of a dull cinnamon color, about 76 mic. in length.

77. MARASMIUS CUCURBITULA MONT. SYLL. CRYPT. No. 443.

Caespitose. Pileus fleshy-membranaceous, convexo-campanulate, the center umbonate, the margin strangulate-revolute, flesh-color, then yellowish, then dry reddish-brown. Stipe cartilaginous rigid, concolorous, fistulous, glabrous, thickened at apex and base. Lamellae close, unequal, narrow, attenuate-adnexed, pallid.

Growing on wood sunk in the ground. Pileus 4-6 cm. in diameter, the stipe 5-8 cm. long and 2-3 mm. thick in the middle.

78. MARASMIUS NUPTIALIS MORGAN SP. NOV.

Pileus a little fleshy, campanulate then expanded, subumbonate, fulvous, expallent, the surface wrinkled and pitted. Stipe cartilaginous, tapering upward, hollow, smooth and glabrous above, below clothed with a dense white villosity, white at the apex, fulvescent downwards. Lamellae rather narrow, close, white, adnexed-seceding; spores lanceolate, hyaline 9-11 x 3-4 mic.

Growing on rotten wood among old leaves. Pileus 3-4 cm. in diameter, the stipe 7-10 cm. long and 4-7 mm. thick, usually several bound together into a fascicle by the dense white villosity.

B. STIPE PRUINATE OR VELVETY.

a. Lamellae free from the stipe.

79. MARASMIUS LACHNOPHYLLUS Atkinson's Mushr. 132, *Agaricus lachnophyllus* Berkeley. Lea's Catalogue. 1849.

Subcaespitose. Pileus a little fleshy, conic-hemispheric, of a rich tawny-brown, clothed with short, velvety pubescence, much wrinkled when dry. Stipe tough, hollow, brownish-purple below, shaded off into white above and clothed with scattered short pubescence, downy and rather bulbous at the base. Lamellae narrow, close, quite free, velvety with tawny pubescence; spores ovoid-oblong, obliquely apiculate, 6-8 x 3-4 mic.

Growing on rotten wood amongst old leaves. Pileus 2 cm. in diameter, the stipe 5 cm. long and 2 mm. thick. The surface of the whole plant, pileus, stipe and lamellae is clothed with brown setulae 70-90 mic. in length.

80. MARASMIUS ALLIACEUS Fries, Hym. Eur. Agaricus alliaceus Jacquin. Misc, Austr. 1778.

Strong-smelling. Pileus submembranaceous, campanulate then expanded, subumbonate, even then sulcate, expallent. Stipe horny, tall, rigid, velvety-pruinate, black, the base rooting and naked. Lamellae free, dusky-white; spores elliptic-oblong, 10-12 x 6-8 mic.

Growing amongst old leaves on rotten wood. Pileus 2-4 cm. in diameter, the stipe 8-12 cm. long and about 3 mm. thick. There is no tinge of red in any part of the plant; the young pileus is often milk-white. It is particularly distinguished by its strong smell of garlic.

b. Lamellae attached to the stipe.

81. MARASMIUS PYRRHOCEPHALUS Berkeley, Lea's Cat. 1849.

Pileus convex, umbilicate, membranaceous, red-brown, glabrous, plicate-striate. Stipe slender, brown, closely velvety below, generally rooting, paler above, more or less densely covered with short pale hairs and meal; mycelium arachnoid, white. Lamellae white, at length pale alutaceous, ventricose, shortly adnate; spores 9-11 x 4-5 mm.

Growing on the ground in damp woods. Pileus 4 mm. in diameter, the stipe 4-5 cm. long. Two forms occur, the one smaller and more delicate than the other.

82. MARASMIUS MACRORRHIZUS Montagne, Syll. Crypt. 1856.

Pileus membranaceous, convex then explanate, reddish, from the even center to the spreading margin striatulate. Stipe tall, fistulous, with a long root, velvety-pruinate, red-brown. Lamellae sub-distant, undulate, white, attenuate-adnexed.

Growing on rotten wood. Pileus 1-2 cm. in diameter; the root attenuate, 3-4 cm. long, everywhere emitting fibrils.

MARASMIUS LONGIPES PECK 26 N. Y. REP. 1873.

Pileus thin, convex, glabrous, finely striate on the margin, tawny-red. Stipe tall, straight, equal, hollow, pruinose-tomentose, radicating, brown or fawn-color, white at the top. Lamellae not crowded, attached, white.

Growing among fallen leaves in woods. Pileus 8-12 mm. in diameter, the stipe 5-12 cm. long and 1 mm. thick. The tall straight, slender stem is the characteristic feature of this plant.

84. MARASMIUS HIRTIPES CLEMENTS. SURVEY NEB. IV. 1896.

Pileus plano-convex, membranaceous, scarcely umbilicate, slightly radiate-sulcate, glabrous, tawny. Stipe elongated, filiform, hollow, dark rufous, beset with white or tawny hairs. Lamellae rather numerous, adnate, linear, white or dilute yellow; spores ellipsoid, 7 x 4 mic.

Growing on the ground. Pileus 3-7 mm. in diameter, the stipe 3-8 cm. long and less than 1 mm. thick.

MARASMIUS PAPILLATUS PECK, 24 N. Y. REP. 1871.

Pileus submembranaceous, convex then expanded, with a small umbo or papilla, obscurely striate on the margin, dirty white or gray, sometimes with a pinkish hue. Stipe slender, firm, hollow, concolorous, pruinose, deeply rooting. Lamellae narrow, close, attached white or yellowish.

Growing on rotten, mossy logs in woods. Pileus 8-20 mm. in diameter, the stipe 3-5 cm. long and 1 mm. thick.

II. SARMENTOSI. *Stipes arising from an ascending or prostrate common stem.*

A. STIPES GLABROUS.

86. MARASMIUS BREVIPES B. & RAV. ANN. & MAG. N. H. 1853.

Pileus convex, dark blood-red, the margin even. Stipe short, filiform, jet-black, quite smooth, springing from creeping mycelioid threads of the same nature with itself. Lamellae few, adnate, rufous.

Growing on dead twigs of Oak. Pileus 2-4 mm. in diameter, the stipe 2-4 mm. long.

87. MARASMIUS MULTICEPS B. & C. FUNGI CUB. 132.

Pileus pure white, hemisphaeric umbilicate, sulcate, transversely rugulose. Common stem creeping, proliferous, black, rigid, sending up the vertical stipes. Lamellae few, white, furnished with a collar.

Growing on old logs in woods. Pileus 6-7 mm. in diameter, the stipe 12-25 mm. in length, the common stem many centimeters long. Nearly allied to M. polycladus Mont.

B. STIPES PUBESCENT.

88. MARASMIUS SARMENTOSUS Berk. Journ. Bot. 1849.

Pileus hemispheric, brownish, at first umbonate, densely silky, the margin involute, at length expanded. Stipe clothed with depressed hairs, at length glabrescent, remarkably sarmentose.

Growing on old leaves and branches. Pileus 1-2.5 cm. in diameter, the stipe 20-22 cm. long.

89. MARASMIUS TOMENTELLUS B. & C. Fungi Cub. 131.

Pileus convex, sulcate, tawny. The common stem creeping, black, white-pubescent; the stipes short, pubescent. Lamellae few, concolorous with the pileus.

Growing on dead wood. Pileus 2 mm. in diameter, the stipes 4 mm. long, the common stem many centimeters long.

III. GLABELLI. *Pileus thin, membranaceous, convex or campanulate, commonly plicate-sulcate. Stipe slender, nearly always glabrous, arising from a floccose tubercle or from a circular disk. Lamellae few or distant, free or adnexed. Growing on old wood, sticks, leaves, etc.*

a. Lamellae free or subfree.

90. MARASMIUS SICCUS Fries, Epic. 1838. A (Mycena) siccus Schweinitz Syn. Car. 1822, A. (Collybia) siccus Schweinitz N. A. F. 1834.

Pileus membranaceous, campanulate, obtuse, rugulose, pale rose-color. Stipe horny, filiform, long, glabrous, shining, black. Lamellae venose, distant, white.

Growing among deciduous leaves. Pileus 1-2 cm. in diameter.

91. MARASMIUS HAEMATOCEPHALUS Fries, Epic. 1838, A. (Mycena) haematocephalus Montagne, Ann. Sc. Nat. 1837 & Sylloge Crypt. 1856.

Pileus thin, membranaceous, convex, radiate-plicate, blood-red, the disk darker and rugulose. Stipe slender, even, glabrous, cinereous-black, shining, red at the apex, the base dilated into a pale orbicular membrane. Lamellae few, equal, whitish, attenuate and contiguous to the stipe.

Growing on old leaves, rotten wood, etc. Pileus 8 mm. in diameter, the stipe 3-5 cm. long and scarcely thicker than a hog bristle.

92. MARASMIUS FERRUGINEUS Berkeley Journ. Bot. 1843.

Pileus membranaceous, convex, plicate, saffron-ferruginous. Stipe slender, twisted, cinereous-black, glabrous, shining; the base orbicular, minutely hairy. Lamellae pallid, attenuate behind, venose between.

Growing on old leaves, branchlets, etc.

93. MARASMIUS CAMPANULATUS PECK, 23 N. Y. REP. 1870.

Pileus membranaceous, convex or campanulate, dry, glabrous, radiate-sulcate, ochraceous-red, the disk a little darker. Stipe tough, smooth, shining, blackish-brown, hollow. Lamellae few, distant, broad, narrowed toward the stipe, free or slightly attached, whitish.

Growing on dead leaves, etc., in woods. Pileus 6-12 mm. in diameter, the stipe 3-5 cm. long.

94. MARASMIUS GLABELLUS PECK, 26 N. Y. REP. 1873.

Pileus membranaceous, convex then expanded, distantly striate, often uneven on the disk, dingy ochraceous. Stipe corneous, equal, glabrous, hollow, shining, reddish-brown or chestnut, whitish at the top, mycelio-thickened at the base. Lamellae broad, distant, unequal, free, whitish, venose between.

Growing on fallen leaves in woods. Pileus 1-2 cm. in diameter, the stipe 3-5 cm. long and 1 mm. thick.

95. MARASMIUS PULCHRIPES PECK, 24 N. Y. REP. 1871.

Pileus membranaceous, campanulate, obtuse, distantly striate, dry, glabrous, of a soft maroon or vinous-red color. Stipe tough, glabrous, shining, brownish-black, clear red at the top. Lamellae few, distant, narrow, ascending free.

Growing on sticks and acerose leaves among moss in woods. Pileus 4-8 mm. in diameter, the stipe 3-4 cm. long and not 1 mm. thick.

96. MARASMIUS GLEBIGENUS FRIES. NOV. SYMB. 1851.

Pileus very delicate, membranaceous, campanulate then expanded and umbilicated, deeply plicate, whitish. Stipe very slender, glabrous, brown-black, arising from a small glebose bulb. Lamellae few, broad, equal, very distant, free.

Growing on the ground which the mycelium gathers into a ball or root-like mass. Pileus 4-6 mm. in diameter, the stipe 5-8 cm. long, but almost capillary.

b. Lamellae attached to the stipe.

a. Lamellae colored.

97. MARASMIUS PRUINATUS B. & C. ANN. & MAG. N. H. 1859.

Pileus campanulate, pale umber, pruinose, sulcate, rugulose. Stipe setiform, shining, pale, cinerous or tingled with reddish-brown, arising from a thin white superficial mycelium. Lamellae few, distant, ochraceous.

Growing on little bits of grass, etc. Pileus 12 mm. in diameter, the stipe 5 cm. in height.

98. MARASMIUS HINNULEUS B. & C. FUNGI CUB. 115.

Pileus subconic, sulcate, glabrous, shining, fulvescent. Stipe pellucid, glabrous, concolorous, attached by a strigose base. Lamellae thick, distant, adnexed.

Growing on dead leaves. Pileus 8-9 mm. in diameter, the stipe 2-3 cm. in height.

99. MARASMIUS PHAEUS B. & C. FUNGI CUB. 130.

Pileus thin, sphaeric, dark-colored. Stipe opaque, brown, attached by a spongy base, at the summit pellucid and black. Lamellae few, concolorous with the pileus.

Growing on old bark. Pileus 8 mm. in diamater, the stipe 1-2 cm. in height.

100. MARASMIUS HYPOPHAEUS B. & C. FUNGI CUB. 129.

Pileus thin, subglobose, at length plicate-sulcate, blood red to rufous. Stipe rigid, opaque, striate umber; the base orbicular, byssoid-rugose. Lamellae few, thick, brown or blackish, reaching the stipe.

Growing on dead wood. Pileus 12 mm. in diamater, the stipe 2 cm. in height.

101. MARASMIUS SANGUINEUS COOKE & MASSEE, GREV. XVII. 59.

Pileus convex, membranaceous, blood-red, glabrous, even. Stipe long, glabrous, pallid. Lamellae few, very distant, ventricose, adnexed, concolorous with the pileus.

Growing on old leaves in woods; Dominica. Pileus 1-1.5 cm. in diameter, the stipe 4 cm. long.

102. MARASMIUS FULVICEPS CLEMENTS, BOT. SURVEY IX. 1896.

Pileus convex-campanulate, afterward convex or nearly explanate, membranaceous, strongly radiate-sulcate, wrinkled, glabrous, umbonate, tawny-ferruginous. Stipe medullose, flexuous, even, shining, brown, paler at the apex. Lamellae distant, adnexed, dark ochroleucous; spores fusoid, hyaline, 18-20 x 5 mic.

Growing on dead leaves. Pileus 5-15 mm. in diameter, the stipe 4-6 cm. long and 1 mm. thick.

b′. Lamellae white or pallid.

103. MARASMIUS TENER B. & C. PROC. AM. ACAD. 1862.

At first all white, by dryness umber. Pileus hemispheric, striate, finely pulverulent. Stipe at length glabrous, shining, attached by a small floccose base. Lamellae rather broad, adnate.

Growing on dead branchlets and on rotten wood. Related to *M. androsaceus.*

104. MARASMIUS INAEQUALIS B. & C. FUNGI CUB. 114.

Pileus convex, white, plicate. Stipe elongated, above white and pellucid, below opaque, shining, pale yellow, the base strigose, slightly furfuraceous. Lamellae few, thick, obtuse, white.

Growing on dead sticks.

105. MARASMIUS TORTIPES B. & C. FUNG. CUB. 128.

Pileus white then lead-color, minutely pubescent, campanulate, umbilicate, sulcate. Stipe elongated, twisted, subdiaphanous, glabrous, arising from an abundant superficial mycelium. Lamellae concolorous with the pileus.

Growing on rotten wood. Pileus 12 mm. in diameter, the stipe 7-8 cm. long and 1 mm. thick.

106. MARASMIUS ALBO-MARGINATUS CLEMENTS, BOT. SURVEY IV. 1896.

Minute. Pileus membranaceous, convex, glabrous, sulcate, purple, the margin paler. Stipe equal, glabrous, shining, lemon-yellow. Lamellae few, distant, adnate, white; spores ovoid, 5 x 2-3 mic.

Growing on shaded ground. Pileus 1-2 mm. in diameter, the stipe 10 mm. long and ½ mm. thick.

IV. INSITITII. *PILEUS, THIN MEMBRANACEOUS, CONVEX OR CAMPANULATE, USUALLY PLICATE-SULCATE. STIPE FILIFORM, RIGID OR OFTEN FLACCID, MOSTLY GLABROUS, THE BASE INSITITIOUS. LAMELLAE EITHER ATTACHED TO THE STIPE OR FREE; IN THIS CASE THEY ARE ATTACHED TO A COLLAR WHICH ENCIRCLES THE APEX OF THE STIPE AND IS FREE FROM IT.*

Growing commonly on the petioles, midribs and principal veins of old leaves, sometimes on herbaceous stems, etc.

A. STIPE GLABROUS.

a. Lamellae attached to the stipe.

a'. LAMELLAE COLORED.

107. MARASMIUS POECILUS BERK. JOURN. BOT. ETC. 1856.

Pileus campanulate, fulvous. Stipe setiform, umber, insititious. Lamellae adnexed, ventricose, yellow, the spaces between even and fulvous.

Growing on old leaves. Pileus 8-9 mm. in diameter, the stipe 3.5-4 cm. long.

108. MARASMIUS MELANOPUS MORGAN, JOURN. SOC. N. H. 1895.

Pileus membranaceaus, convex, glabrous, not striate, purplish-gray. Stipe slender, hollow, glabrous, black, smooth, polished and shining. Lamellae adnate, subdistant, rather broad, purplish-gray; spores obovoid, apiculate, 5-6 x 2.5 mic.

Growing on old leaves. Pileus 4-6 mm. in diameter, the stipe 2-4 cm. long.

b'. LAMELLAE WHITE.

a''. Pileus colored.

109. MARASMIUS ANDROSACEUS FRIES. EPIC. 1836. *Agaricus androsaceus* LINNAEUS, SP. PLANT. 1753.

Pileus membranaceous, convex, subumbilicate, striate, glabrous. Stipe horny, fistulous, glabrous, black. Lamellae adnate to the stipe, distinct, simple, whitish; spores ovoid-oblong, 6-8 x 3-4 mic.

Growing on old leaves in woods. Pileus 6-12 mm. in diameter, the stipe 3-5 cm. long.

110. MARASMIUS BAMBUSINUS FRIES. EPIC. 1838. *Agaricus bambusinus* Fries in Linnaea V.

Pileus membranaceous, very delicate, convexo-plicate, rufescent. Stipe capillary, glabrous, blackish. Lamellae adnate, few, equal, venose, white.

Growing on fallen culms of sugar-cane. Antilles. A common species.

111. MARASMIUS RHODOCEPHALUS FRIES. NOV SYMB. 1851.

Pileus membranaceous, convex, plane, sulcate, persistently rose-red, the margin entire. Stipe setiform, glabrous, shining, pale brown; the base simple, insititious. Lamellae few and very distant, equal, pallid, adnate.

Growing on old roots and branches; Mexico. Pileus 4-6 mm. in diameter, the stipe 2-3 cm. long.

112. MARASMIUS HELVOLUS BERK JOURN. BOT. 1856.

Pileus campanulate, fulvescent, nearly even, the margin undulate. Stipe brown, insititious. Lamellae few, ventricose, adnexed, pallid.

Growing on dead leaves and old trunks. Pileus 13 mm. in diameter, the stipe 2-3 cm. long.

113. MARASMIUS ACICULIFORMIS B. & C. FUNGI. CUB. 121.

Pileus convex, fulvous, scarcely sulcate. Stipe setiform, rigid, glabrous, shining, fulvescent. Lamellae few, whitish.

Growing on sticks in woods. Pileus 4 mm. in diameter, the stipe 3-4 cm. in hight. The forest of stiff shining stems is characteristic of the species.

114. MARASMIUS MINUTUS PECK, 27 N. Y. REP. 1874.

Pileus membranaceous, convex, glabrous, striate-sulcate, reddish-brown. Stipe capillary, glabrous, shining, blackish-brown. Lamellae subvenose, unequal, sometimes branched, white.

Growing on old leaves in woods and swamps. Pileus 2-4 mm. in diameter, the stipe about 2 cm. in hight.

b''. Pileus white or whitish.

115. MARASMIUS SIMILIS B. & C. SILL. JOURNAL. 1850. *Agaricus tenuipes* Léveille Ann. Sc. Nat. 1846.

Non ejusdem. 1844.

Pileus membranaceous, convex, sulcate, glabrous, white. Stipe slender, naked, more dilute above. Lamellae distant, adnate, white.

Growing on stems. We have not seen the original description.

116. MARASMIUS PROLETARIUS B. & C. FUNGI. CUB. 112.

Pileus convex, slightly sulcate, white. Stipe rigid, opaque, pallid. Lamellae rather broad, white, reaching the stipe.

Growing on old sticks. Pileus 2 mm. in diameter, the stipe 1-2 cm. in hight. "This pretty species forms a little forest of pilei."

117. MARASMIUS PIRINUS ELLIS. BULL. TORR. BOT. CLUB. 1881.

Minute. Pileus membranaceous, hemispheric, sometimes slightly umbilicate, sulcate-striate, at first pallid, afterward chestnut. Stipe filiform striate, brown, paler above. Spores obovoid, 3.5-4 mic. long.

Growing on decaying pear leaves lying on the ground. Pileus about 1 mm. in diameter, the stipe about 6 mm. long. The outer coat of the pileus consists of a layer of ovoid, echinulate cells.

118. MARASMIUS SUBVENOSUS PECK, 23 N. Y. REP. 1870.

Pileus membranaceous, dry, convex, subumbilicate, radiate-sulcate, glabrous, white or yellowish. Stipe tough, glabrous, shining, brown, paler above. Lamellae few, distant, sometimes branched and subvenose, white or yellowish, adnexed.

Growing on dead herbaceous stems and leaves. Pileus 4-8 mm. in diameter, the stipe 17-25 mm. in hight.

119. MARASMIUS FILIPES PECK, 24 N. Y. REP. 1871.

Pileus membranaceous, convex, obscurely radiate-striate, subumbilicate, white. Stipe long, filiform, flaccid, glabrous, whitish, sometimes brownish at the base. Lamellae few, distant, adnate, white.

Growing on fallen leaves of Abies. Pileus about 2 mm. in diameter, the stipe 2-4 cm. long scarcely thicker than hog bristles.

120. MARASMIUS STRAMINIPES PECK, 26 N. Y. REP. 1873.

Pileus membranaceous, hemispherical or convex, glabrous, striate, whitish. Stipe filiform, glabrous, shining, pale straw-color. Lamellae distant, unequal, attached, white.

Growing on fallen leaves of Pinus rigida. Pileus 2-6 mm. in diameter, the stipe 3-5 cm. in hight.

b. Lamellae adnate to a free collar.

121. MARASMIUS ROTULA FRIES. HYM. EUR. *Agaricus rotula* Scopoli, Flor. Carn. 1772.

Pileus membranaceous, a little convex, umbilicate, plicate, whitish, of a uniform color or darker on the disk. Stipe horny, fistulous, shining, glabrous, blackish, arising from a root-like mycelium, often sarmentaceous. Lamellae few, broad, distant, joined together behind into a free collar, whitish; spores 6-8 x 3-4 mic.

Growing on fallen trunks and old leaves. Pileus 2-6 mm. in diameter; the stipe 2-3 cm. long, "frequently branched and sarmentose, with or without abortive pilei."

122. MARASMIUS ROTALIS B. & BR. FUNGI OF CEYLON. 1871. *M. Rotula,* var *fuscus* B. & C. Fungi Cub. 118.

Pileus hemispheric, umbilicate, sometimes umbonate, sulcate, pulverulent, umber. Stipe setiform, black, shining insititious.

Growing on dead leaves and twigs. Pileus 2 mm. in diameter, the surface parted by about 12 deep furrows. Stipe 1-2.5 cm. long.

123. MARASMIUS CAPILLARIS MORGAN, JOURN. CIN. SOC. 1883.

Pileus membranaceous, convex, umbilicate, plicate-sulcate, very minutely wrinkled, in color varying from alutaceous to umber, except the white umbilicus. Stipe long, capillary, glabrous, black, shining, the base insititious. Lamellae equal, rather broad, white, adnate to a free collar; spores lance-oblong, 8-10 x 4-5 mic.

Growing on old leaves and sticks in woods. Pileus 2-5 mm. in diameter, the stipe 3-6 cm. long, the base always insititious. There are 12-18 furrows on the pileus corresponding to the same number of lamellae underneath.

(*To be continued*)

THE GENERA BALANSIA AND DOTHICHLOE IN THE UNITED STATES[1] WITH A CONSIDERATION OF THEIR ECONOMIC IMPORTANCE.

BY GEO. F. ATKINSON.

BALANSIA.

The genus Balansia was described by Spegazzini[2] twenty-five years ago from specimens collected on spikes of Setaria or Pennisetum in Brazil. The genus in some respects bears a relationship to Claviceps but in other respects is widely different. The mycelium infests the inflorescence or stems of certain grasses forming a stroma or pseudosclerotium in which are mingled the tissues and parts of the affected host. A cross section then shows a mass of fungus tissue with parts of the host here and there as shown in Plates 81-83. In some species and especially in the earlier ones described the fruiting stromata, which are outgrowths from the vegetative stroma or sclerotum, are many of them stipitate and capitate thus resembling Claviceps purpurea, but different from Claviceps in the stroma being composite, that is, it consists of host elements intermingled with the fungus elements. Furthermore the fruiting stromata are formed during the same season and not after the sclerotium passes a period of rest as in Claviceps. Many of the fruiting stromata, however, are sessile, and both stipitate and sessile ones are found intermingled in *Balansia claviceps* Speg. (see Plate 87, fig. 21), the type specimen, and in others. The conidial stage is also different from that of Claviceps in the species in which it has been found. The sessile fruiting stromata resemble in form and color the hemispherical or oval stromata of certain species of Hypoxylon.

In 1875 Dr. Chas. Peck[3] described a new species of fungus on young fruiting spikes of Danthonia spicata from Sandlake, N. Y., as *Epichloe hypoxylon,* with the remark that "in shape and color this plant is suggestive of the genus Hypoxylon, but its habitat and spores point to Epichloë." This species has been found since but a few times and is not well understood judging from certain specimens distributed in herbaria as *Hypocrea hypoxylon* (Pk.)[4] and from the treatment of the species by Saccardo[5] who placed it in Hypocrella (*Hypocrella hypoxylon* (Pk.) Sacc.)

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[1] Contributions from the Botanical Department, Cornell University No. 107.

[2] Fungi Argentini, Pugillus 1, No. 253, 1880.

[3] 27th Rept. New York State Mus., 108, 1875.

[4] Ellis and Everhart N. A. F., No. 2373 on Panicum agrostoides, Jackson, Miss., 1889.

[5] Sylloge Fung., *2*, 581, 1883.

and by Ellis[6] who followed Saccardo using the combination *Hypocrella hypoxylon* (Pk.), but also included as synonyms *Hypocrea atramentosa* B. & C., and *Dothidea vorax, atramentaria* and *pilulaeformis* of B. & C., and Cooke[7] says "according to specimens in Ellis & Everhart's North American Fungi, this" — (*Epichloe hypoxylon Pk.*) — "is identical with *Hypocrella atramentosa* Berk. & Curt., in Saccardo Syllog, No. 5066." This confusion in the identity of the plant led me into a serious mistake several years ago because I accepted specimens of a fungus marked "*Hypocrea hypoxylon* Pk.," distributed in several herbaria as identical with Peck's species, not having had access at that time to the type specimen. The specimens marked "*Hypocrea hypoxylon*" to which I refer, it was easy to see were identical with *Hypocrea atramentosa* B. & C., which is quite common on blades of Andropogon and other grasses in the Southern States as I had occasion during my residence in Alabama to learn. Unfortunately therefore the *Epichloe hypoxylon* Pk., and *Hypocrea atramentosa* B. & C., were considered by me at that time to be identical, when in reality I had seen only specimens of the latter, some of which had been determined as *Epichloe hyphoxylon* by a misunderstanding. At that time *Hypocrea atramentosa* B. & C., was made by me the type of a new genus *Dothichloe.*[8] While it was intended, therefore, that *Hypocrea atramentosa* B. & C., should be the type of the new genus Dothichloë, and it was the plant which I had especially in mind for the type species, unwittingly the name of an entirely different fungus (*Epichloe hypoxylon* Pk.) was included. Since this species name was the earlier one it was employed with the result that *Dothichloe hypoxylon* (Pk.) would actually refer in name to a plant which did not at all agree with the concept of the species actually used as the type of the genus. A few years ago I had an opportunity of examining the type of *Epichloe hypoxylon* in the State Herbarium at Albany and found that it was an entirely different plant from *Hypocrea atramentosa* B. & C.

It is in fact a Balansia as I discovered in my study of this species in 1901. During that year Professor Kellerman collected a considerable quantity of fine material at Vinton, Gallia Co., Ohio, on Danthonia spicata some of which he communicated to me. The pseudosclerotium is curved, more or less irregularly formed in the spike, 4-8 mm. long and 2-3 mm. in diameter. It is gray in color, whitish within, often with irregular rifts in the interior between adjacent elements of the spike. The layers are composed of the interwoven threads of the fungus with disintegrated remnants of the cells of the palae, leaves, axils, etc., of

[6] Ellis, North Am. Pyren., 91, 1892.
[7] Grev., *19*, 80, 1891.
[8] Steps toward a revision of the linosporus species of graminicolous Hypocreaceae, Bull. Torr. Bot. Club, *21*, 220, 1894.

the host, in walls of the rifts. The stromata (fruit bodies) are black on the exterior, whitish within, and are somewhat obovate, depressed and sessile, from 1-2 mm. broad and about 1 mm. high, the surface minutely papillate from the slight but evident elevations at the opening of the perithecia. In depauperate specimens fruit bodies are not well formed. The perithecia are immersed in the fruit body, ovate to flask-shaped and 300-400x150-200 μ, the wall not very distinct from the stroma but quite evident in stained preparations. The asci are quite mature in these specimens, are 150-200 x 7-8 μ, with a small cap "cell" and tapering at the base. The spores are filiform, eight in number and nearly the length of the acus, about 1 μ in diameter. The segments are 3-4 μ long.

I have also received specimens of the same species from Dr. R. Thaxter collected on Danthonia spicata at New Haven, Aug. 1889, and at Kittery Point, Me., Aug., 1901. I have seen specimens sent to Dr. Peck and collected by J. L. Sheldon on Danthonia spicata in Connecticut, July 17, 1901.

During 1900 and 1901 Professor W. H. Long collected what is probably the same species in Texas on an undetermined grass and deposited some of the material in the Herbarium of the Botanical Department of Cornell University. This material Mr. Long recognized as belonging to the genus Balansia. The fungus attacks apparently the very young inflorescence or young leaves or both, forming a pseudosclerotium, gray to blackish in color outside and white within, about 4 to 10 or 15 mm. long and 2-4 mm. in diameter, composite in character as in the case of the specimens from Ohio. On these are formed the hemispherical to subglobose fruiting stromata, black on the outside and whitish within, and punctate with the minute slightly projecting ostiola of the perithecia. The perithecia are flask-shaped, immersed, and 200-270 x 100-120 μ, the wall as in the Ohio specimens not very distinct from the stroma but evident in stained preparations. The asci are not as mature as in the Ohio specimens, are cylindrical with a tapering pedicel, and hyaline cap "cell," 120-150 x 6-7 μ. The spores are eight in number, nearly the length of the ascus and are about 1 μ in diameter. The Texas specimens are not so mature as the Ohio specimens, and this probably acounts for the fact that the spores examined were not separated into segments. This probably also accounts for the smaller size of the perithecia and asci. The stromata are not so constricted at their point of attachment to the sclerotium as those of the Ohio specimens. Otherwise the material from Texas and Ohio agree specifically, and the difference noted when the differences in age taken into account would not warrant the separation of the two into distinct species, unless inoculation experiments and studies of development should show them to be specifically distinct.

In some of the Texas specimens the young sclerotium was covered with a fine white powder consisting of short acicular

conidiophores 3-4 μ in diameter, bearing obovate to elliptical or fusoid, hyaline conidia 3-4 x 1.5-2 μ. At first this was supposed to be the conidial stage, but this does not seem probable in view of the fact that the conidial stage of *Balansia trinitensis* C. & M. is an Ephelis,[9] and an Ephelis has also been found several times on the sclerotium on Danthonia spicata even accompanying the Balansia stage in the case of the Ohio specimens. The conidial fungus on the few Texas specimens may have been a parasite os saprophyte, or indeed a second conidial stage, corresponding to the microconidia of some Sphaeriales, but development studies will be necessary to determine this point.

In examining the specimens carefully I discovered on some of the Ohio material the conidial stage which is of the Ephelis type, and it proved to be the *Ephelis borealis*[10] E. & E. The conidial stage *Ephelis borealis* as an " imperfect fungus" is to be found among the Excipulaceae. The conidial fructification is a disk-shaped or cup-shaped structure resembling some forms of the Perzizales, but long slender conidia are found on the disk (Plate 86, figs. 15, 16). The discovery of a conidial fructification of the Ephelis type is additional evidence that this species is a Balansia, for Cooke[11] and Massee have shown that *Ephelis trinitensis* C. & M. is the conidial stage of *Balansia trinitensis* C. & M.

In 1854 Berkeley described *Dothidea vorax*[12] as follows:

"485. Dothidea vorax Berk. et Curt. Spicis deformibus caulibusque innascens, subglobosa vel omnino effusa, nigra, granulata; cellulis minutis; ascis cylindriciis obtusis fragilissimis; sporidiis filiformibus.

"Hab. on the deformed spikes of some *Carex*, Khasia (Churra), Aug. (Dr. Hooker.) On *Uniola* and *Panicum*, Rev. M. A. Curtis, South Carolina.

"Black, subglobose, varying in size from a mere speck to that of a millet seed, or altogether effused, minutely granulated. Cells minute. Asci cylindrical, obtuse, curved, very fragile, spores filiform, extremely slender.

"Nothing can be at first sight more different than the effused specimens on the stem of *Uniola;* but others on *Uniola* are much larger than the Khasia specimen, insomuch that the species was first named *D. pitulaeformis.*"[13]

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[9] A new development of Ephelis, Ann. Bot., *3*, 33-40, pl. 4, 1889.

[10] Jour. Mycol., *1*, 86, 1885. See also Ellis N. Am. Pyren., 91, 1892, where he says Ephelis borealis is only the stylosporous stage of Hypocrella hypoxylon (Pk.).

[11] A new development of Ephelis, Ann. Bot., *3*, 33-40, pl. 4, 1889.

[12] Hooker's Jour. Bot., *6*, 227, 1854 (I am under obligations to Dr. W. A. Murrill, N. Y. Bot. Gard., for the date of this publication). Decades Fung i, XLIX, L, p. 3, No. 485.

[13] In the first publication of the name *"D. pitulaeformis"* there appears to be a typographical error, since Berkeley evidently intended *"D. pilulaeformis"* (from *pilula* = a little ball in allusion to minute rounded

In September 1903 I had the opportunity of examining the type material of *Dothidea vorax* B. &. C. in the Herbarium of the Royal Gardens at Kew, England. This species is based on two different genera and three species. The part of the type on spikes of Carex from India is a Balansia, while the part on Panicum from South Carolina is probably *Hypocrea atramentosa* B. & C.

The Balansia specimens of the *Dothidea vorax* B. & C. resemble in some respects the *Epichloe hypoxylon* Pk., but I believe it differs sufficiently to retain it as a distinct species. The sclerotium is much larger, more irregular and of a coarser structure while the fruiting stromata have also a coarser and rougher exterior and are not so prominently constricted at the point of attachment to the substratum. But it is a closely related species, striking out the effused forms on Uniola and Panicum from South Carolina. Saccardo[14] in 1883 founded the genus Ophiodothis on *Dothidea vorax* B. and C., since it was not propely located in Dothidea. Ophiodothis, however, cannot stand for this species since Balansia antedates it by three years.

Under what genus name then shall these specimens of Balansia stand? *Balansia* Spegazzini (l. c.) was well founded in 1880. but the genus Ephelis Fries was founded in 1849.[15] Although the type species was an imperfect fungus it was placed in the discomycetes. Phillips[16] uses Ephelis in an entirely different sense for that of true discomycetes with ascigerous forms having no relationship to the true Ephelis, which is the conidial stage of Balansia, one of the Hypocreales. In fact the type species, *Ephelis mexicana* Fr., may be the conidial stage of the Balansia collected by Long from Texas, and Ellis (l. c.) suggests, in the description of *E. borealis* on Danthonia spicata from Nova Scotia, that it may be identical with *E. mexicana* Fr. Since Ephelis represented at first an imperfect stage it should not I believe replace a well founded genus of a perfect form though described at a later date, though I am aware that some writers probably hold the opposite view. Balansia Spegazzini then is the proper genus name to employ, and the diagnosis emended may be given as follows:

BALANSIA Spegazzini, Fungi Guar. Pugill. I, 1880 Emend. Atkinson.

Sclerotium composite, formed of the affected parts of the host, which are imbedded in a well developed and more or less compact fungus tissue, the elements of which also penetrate the

stromata). In later publications the latter orthography is used. However, the species name has no standing, since a description of it under this name was never published. See note relative to this later in the present article.

[14] Syll. Fung., *2*, 652, 1883.

[15] Summa Veg., Scand., 370, 1849.

[16] Manual Brit. Disc., 358, 1887.

host, and fill the spaces between leaves, palae, etc., when these are involved as is the case when the fruiting axes of the host are affected. Stromata arising from the sclerotium, stipitate and capitate, or sessile, pulvinate, obovate, discoid, or separated from the sclerotium by a constriction, germinating from the sclerotium as soon as the latter is mature, surface slightly papillate from the ostiola of the immersed perithecia. Stroma well developed so that the bases of the perithecia are separated from the pseudo-sclerotium or host by abundant fungus tissue even in the sessile forms. Asci aparaphysate, 8-spored. Spores filiform, nearly equaling the asci. Conidial stage when present, so far as known, of the ephelial type, and preceding the stromata.

But what specific name shall be used to designate the species in the United States? We cannot be certain that *Ephelis mexicana*[17] Fr. is the conidial stage of the Balansia from Texas, though I believe very likely it is. While some would employ the earliest specific name, even though applied to an imperfect form,[18] the better usage seems to be that which recognizes the earliest specific name applied to the perfect form[19] and *Balansia hypoxylon* is also a more appropriate name than Balansia mexicana. Pending the action of the International Botanical Congress at Brussels in 1910 it seems advisable to follow this usage.

In referring to the effused specimens on the stems of Uniola from South Carolina Berkeley says,[20] "Nothing can at first sight be more different than the effused specimens on the stem of *Uniola;* but others on Uniola are much larger than the Khasia specimen insomuch that the species was first named *D. pilu-*

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[17] While the genus Ephelis was founded by Fries in 1849 (Summa Veg. Scand., 370) he does not appear to have published the specific name nor a specific description. Berkeley in Cuban Fungi (Jour. Linn. Soc., *10*, 353, 1869) gives a description of the species as follows:

"567. Ephelis mexicana Fr., Fung. Mex. (729). On the inflorescence of grasses, which it changes into a black solid mass, somewhat after the fashion of *Dilophosporium. Hab.* Mexico. Hymenium exposed, bearing slender thread-like spores .001 inch long, on delicate sporophores. The fungus resembles a *Peziza* on a black solid stroma."

For *Ephelis mexicana* Fr. writers usually cite both Fries' *Summa Veg. Scand.*, and *Fung. Mex.* Thus far I have failed to find any trace of such a publication by Fries. Mr. Lars Romell, of Stockholm, in reply to an inquiry concerning "Fung. Mexic." writes me, "So far as we can see — Dr. and Professor Fries have assisted me in this search — no work or paper of Elias Fries' hand exists under the name 'Fungi Mexicani.' What the designation 'Fung. Mexic.' will mean I can thus not say at present." It is possible that Fries' reference "Fung. Mexic." refers only to a collection of plants from Mexico, and Berkeley may have supplied the specific name or possibly have used a manuscript name of Fries, or one which Fries had labelled a specimen with and which may have been sent to Berkeley.

[18] See Arthur, J. C., on the Nomenclature of Fungi having many Fruit Forms, Plant World, *8*, 71-76, 99-103, 1905.

[19] See Farlow, W. G., Proc. A. A. A. S., *32*, 66, 1883.

[20] Hooker's Jour. Bot., , 227, 1854.

laeformis." These specimens I have not seen at the Kew Herbarium. But there are specimens from a collection of fungi by Ravenel, which came to Cornell University in the "Horace Mann Herbarium" from South Carolina, and marked in Ravenel's hand "*Dothidea vorax* Berk. et Curt., S. C. Rav." These specimens belong to *Balansia hypoxylon* and seem to agree in size more nearly with the specimens from Texas than with the specimens from Ohio, New York, etc., on Danthonia spicata. The pseudosclerotia as well as the stromata are larger than those on Danthonia spicata. This may be accounted for by the fact that the grass hosts of the Texas as well as the South Carolina specimens are stouter than the Danthonia spicata. The stromata are larger also than those in the Khasia specimen and this is probably what Berkeley refers to when he says "but others on Uniola are much larger than the Khasia specimens," since in his description of the Khasia specimens he refers to the stromata and not to the pseudosclerotium. "*Dothidea pilulaeformis* B. & C." seems never to have been described. It may be only a manuscript name and therefore is a "*nomen nudem*," and cannot take precedence over *Balansia hypoxylon* (Pk.).

The name of the plant and its synonym with emended description would therefore be as follows:

BALANSIA HYPOXYLON (Pk.) Atkinson. Plates 81, 82, 83, 84 and Pl. 87, Figs. 17 and 18.

Epichloë hypoxylon Peck, 27th Rept. N. Y. State Mus. Nat. Hist., 108, 1875.

? Ephelis Fr. Summa Veg. Scand., p. 370, 1849 for genus.

? Ephelis mexicana Berkeley, Jour. Linn. Soc., *10*, 353, 1869.

Ephelis borealis E. & E., Jour. Myc., *1*, 86, 1885; North Am. Pyren, 91, 1892; E. & E., N. A. F., No. 3467 from Newfield, N. J., 1896.

Hypocrella hypoxylon Sacc., Syll. Fung., *2*, 581 ,1883.

Hypocrella hypoxylon Ellis p.p., North Am. Pyren, 91, 1892.

Dothichloë hypoxylon Atkinson p. p. (name only), Bull. Tor. Bot. Club, *21*, 223, 1894.

Pseudosclerotium curved, or more or less irregular, formed in the fruiting axis of the plant, 4-15 mm. long x 1-5 mm. in diameter, gray or blackish in color, whitish within and compact and somewhat brittle when dry, an abundant development of sclerotium elements in which the elements of the host (palae, leaves, axis, etc.) are imbedded, some of which are intact, others materially disintegrated and deformed. Stromata (fruit bodies) black, prominently pulvinate, depressed or rounded, plane or constricted at point of junction with the sclerotium, 1-4 mm. broad x 1-2 mm. high, surface minutely papillate from the ostiola of the perithecia. Perithecia flask-shaped, immersed, 200-400 x 100-200 μ, wall not very distinct from the stroma but evident from its dif-

ferent structure. Asci cylindrical with a tapering pedicel and a hyaline cap 'cell,' 120-200 x 6-8 μ. Spores 8, filiform, nearly the length of the ascus, about 1 μ in diameter, at maturity separating into segments 3-4 μ in length or longer. Conidial stage of the Ephelis type, stromata at first convex, emerging, then pezizoid and slightly margined. Conidia acicular, hyaline or pale yellowish, nearly straight or curved, ends obtuse, 15-25 x .5-.75 μ. On Danthonia spicata, Nova Scotia, Maine, Conn., New York, Ohio; and other grasses, South Carolina, Texas (?Mexico).

The name *Balansia vorax* might well be retained for that portion of Berkeley's species from Khasia occurring on the inflorescence of a Carex, especially since this form is the first one appearing in the original description. But since Berkeley gave an incomplete description of this form and confused it with a species of another generic type it may be well here to add a description of the species:

BALANSIA VORAX (B. & C.) Emend Atkinson. Pl. 87, Figs. 19 and 20. Pseudosclerotium in type specimen over 30 mm. long by 5-8 mm. in diameter, made up of elements of the fungus and the inflorescence of the host, of a coarse texture and rather coarse surface, more or less irregular in outline, not so smooth and compact as in *B. hypoxylon*, black. Stromata scattered over the surface, pulvinate, hemispherical or depressed, black, .5-1.5 μ in diameter, surface minutely punctate from the slightly projecting ostiola. Perithecia ovate, elliptical, 200-300 x 120-150 μ. Asci 150-180 x 6-7 μ. Spores 8, nearly as long as the ascus, separating at maturity into short segments. On inflorescence of some Carex, Khasia, India.

? BALANSIA DISCOIDEA P. Hennings. There are specimens of a fungus parasitic on the stem of an Andropogon from Kansas, in the Ellis Herbarium at the New York Botanical Garden marked "*Dothidea vorax* B. & C." in Ellis' handwriting, and with the following note in Kellerman's writing "On Andropogon, Kansas. Spores filiform, multinucleate, yellowish, 8 in an ascus. Kellerman & Swingle." These seem to be specifically different from both *Balansia hypoxylon* (Pk.) and *Balansia vorax* (B. & C.). The specimens which I have examined are rather old and asci and spores had disappeared from the stromata sectioned and shown in Plate 84, Fig. 11. The spores are, however, septate, 120-150 μ by slightly less than 1 μ in diameter and at maturity separate into short segments. A photograph of a portion of a grass stem affected by this fungus is shown in Plate 87, Fig. 19. The general stroma or pseudosclerotium is thin, dark gray, uniting only with the outer elements of the host. The stromata are prominent, discoid, sessile and punctate with the mouths of the perithecia and vary from .5-1.2 mm. in diameter. So far as one can judge from its appearance it seems to agree with *Balansia*

discoidea P. Hennings[21]. A photograph of this species is reproduced in Plate 88, Figs. 22, 23, from a specimen from the Berlin Museum which I was able to obtain through the courtesy of Dr. Hennings. His description translated reads as follows:

"Balansia discoidea P. Henn. n. sp. Stromata in culms sclerotioid, blackened effuse for about 3- cm. gregarious, lenticular, discoid, frequently compressed, angular, 2-4 mm. diameter, surface punctate-rugulose, black, soft fleshy, drying horny, within pale; perithecia oblong-ovoid, immersed, punctate, ostiolate; asci oblong, cylindrical, apex globulose, truncate, base attenuate, 150-200 x 4-6μ, aparaphysate; spores filiform, longitudinally parallel, septulate, hyaline, about 0.6-8.8μ in diameter.

St Catherine, Blumenau, on Culms of Chloris distichophylla Lag. E. Ule. No. 1334." See Plate 88, Figs, 22, 23.

In the Kansas specimens the mycelium of the general stroma has made little invasion into the tissue of the host. The general stroma is dark gray while that of *Balansia discoidea* from Brazil is black. The latter also is soft and somewhat fleshy when fresh, hard when dry. The Kansas material is also hard and brittle when dry but what the condition was when fresh we have no record. It will be seen that the specimens differ slightly from those of *Balansia discoidea* from Brazil, but it seems better to locate them provisionally in this species. It is to be hoped that students and collectors will search for more of these specimens, endeavor to find the conidial stage, and to make careful notes on the characters of the plant as to consistency, etc., while it is fresh. Good service could be rendered by culture work in this genus.

Hennings says ,l. c. 78) that this species as well as *B. sessilis* P. Henn. from East Africa, in the sesile nature of the stromata show a transition to the Dothidiaceae. The perithecial walls, however, in B. discoidea from Brazil and in Kansas specimens are very distinct from the tissue of the stroma. The *Balansia sessilis*[22] P. Henn. occurs on culms of a species of Andropogon in East Africa. This is also close to *Balansia discoidea* and differs chiefly in the subglobose stromata and the more slender spores, which are ½ μ in diameter. A translation of the descriptions is as follows:

"Balansia sessilis P. Henn. Stromata in black sclerotioid culms, sparse, sessile, subglobose, pulvinate, black, tuberculate, within pallid, fleshy, about 1½-2 m.m. diameter; perithecia immersed, ovoid; asci cylindrical, apex round, thickened, eight spored, base attenuate, 220-300 x 3½-4; sporidia longitudinally parallel, filiform, pluriguttulate or obsoletely septate, hyaline, scarcely ½ μ thick. *Hab.* in culms of Andropogon species, Uluguru, tropical Africa (Goetze.)"

Since Balansia antedates Ophiodothis by three years, the name Ophiodothis cannot be retained for *Dothidea vorax* which was the first species placed in the genus by Saccardo[23]. Nor can the

[21] Heldw., 39 (77) 1900: Sacc. Syll. Fung., *16*, 608, 1902.
[22] Engl. Bot. Jahrb., *28*, 336, 1900. Sacc. Syll. Fung., *16*, 609, 1902.
[23] Syll. Fung. 2, 652, 1883.

genus name be retained for the other species confused both by Berkeley and Saccardo with the *Dothidea vorax*, namely *Dothidea atramentaria* which Saccardo lists as a variety of *O. vorax* (B. & C.) Sacc., and *D. pilulaeformis* also listed by Saccardo as a variety. Two other species were enumerated as belonging to this genus (l. c. 653). Of these *Ophiodothis haydeni* (B. & C.) Sacc.[24] cannot stand as the type of the genus Ophiodothis since it is a conidial stage of an imperfect fungus as I have found by examination of the specimens from the Kew Herbarium. The specimen in E. & E. Fungi Columbiani No. 1332 agrees with this. Berkeley's description reads as follows:

"881. Dothidea Haydeni B. & C. Irregularis papillata, sporidiis linearibus utrinque attenuatis. On stems of Aster and Erigeron, Nebraska, Hayden. No. 6404. Forming elongated, irregular, papillose patches, sporidia linear, attenuated at each end."

Berkeley did not give measurements of the spores. These are 15-25 x 3.5-4.5 μ, narrowly fusoid, or "linear and attenuated at each end." The stroma is thin and the pustules are irregular.

The third species (or the second one in order of position on the page) first placed by Saccardo in Ophiodothis (Syll. Fung., *2*, 653, 1883) is *Ophiodothis edax* (B. & Br.) — *Dothidea edax* B. & Br., and described by them as follows:[25]

"1167. D. edax B. & B. Minuta, punctiformis, nitida, e macula lutea oriunda; ascis lanceolatis; sporidiis filiformibus curvulis multinucleatis (No. 502). In leaves of Tephrosia suberosa. Sporida. .0002 long. On the same spots are minute bright scarlet tendrils consisting of extremely minute spores, which are probably a second form of "fructification."

This species I have not seen and, therefore, cannot express an opinion as to its generic position or whether it sufficiently meets the characters ascribed by Saccardo to his genus Ophiodothis. Later species, however, described after the appearance of Saccardo's publication of the genus come well within the genus and these might be regarded the types of the genus Ophiodothis. Of these I have had an opportunity of examining one, the *Ophiodothis tarda* Harkness[26]. It occurs on dead leaves of Rhus diversifolia. There is a thin, black, irregular, stroma, 3-4 mm. in diameter, punctate from the mouths of the perithecia. The asci are 53-75 x 9-11 μ, pedicellate. There are 8 filiform spores, slightly curved, continuous, guttulate and 30-45 x 2 μ.

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[24] Dothidea haydeni B. & C., North Am. Fungi No. 881. Grev., *4*, 104, 1876.

[25] Enumeration of the Fungi of Ceylon Jour. Linn. Soc. Bot., *14*, 135, 1875.

[26] New California Fungi, Bull. 1, Cal. Acad. Sci., 46, 1884. See Saccardo Syll. Fung., *9*, 1051, 1891.

DOTHICHLOE.

In Berkeley's description of *Dothidea vorax* quoted above he made no note of the vegetative stroma or sclerotium of the Balansia form on the Cyperaceous plant from Khasia, as is evident from the words "black, subglobose, varying in size from a mere speck to that of a millet seed," . . . This applied to the fruiting stromata of the Balansia which are very easily seen in this part of the type on the pseudosclerotium which is the "deformed spike of some Carex."

The description further reads "or altogether effused, minutely granulated." This form is on Uniola and Panicum from South Carolina and is the form referred to by Berkeley as *Dothidea atramentaria*.[27] Berkeley never published a description of this species and it is evident from a study of the specimens in the Royal Herbarium at Kew with notes in Berkeley's handwriting that he confused the species names *atramentosa* and *atramentaria* which were applied by him to the same plant. For example, a part of the type of his *Hypocrea atramentosa*[28] is the No. 4018, on Andropogon, from Alabama. The type specimen now at Kew has the following note in Berkeley's handwriting: "No 4018. Hypocrea atramentaria B. & C., on Andropogon, Alabama, Beaumont," but when he published the species it was written *atramentosa*. On the same sheet in the Royal Herbarium at Kew is the specimen from Cuba also referred to *Hyprocrea atramentosa* in Berkeley's handwriting as follows: "419. Hypocrea atramentosa B. & C., Cuba, Wright."

While Berkeley never published any description of *"Dothidea atramentaria,"* Saccardo practically published a description of the plant as *"var. atramentaria"* of his *Ophidothis vorax*[29], which he drew up from the specimen in Rav. F. Am., No. 100.

The stroma of *Hypocrea atramentosa* B. & C. varies considerably, sometimes well and quite evenly developed, but always as a thin layer on the surface of the host and its thickness not exceeding the length of the perithecia or very slightly. The bases of perithecia, therefore, extend nearly to the surface of the host and there is only a very thin portion of the stroma between the bases of the perithecia and the host (see Plate 85, Fig. 1, a section of the type material of *Hypocrea atramentosa* B. & C.) while in Balansia there is an abundant development of the stroma between the bases of the perithecia and the pseudosclerotium. In other

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[27] Notices of North American Fungi, Grev., *4*, 105, 1876. I wish here to express my obligations to Dr. Dyer, Director of the Royal Gardens at Kew, and to Mr. Massee of the Hebarium for the privileges extended to me in the examination of Berkeley's types of the species mentioned in this article.

[28] Journ. Linn. Soc., *10*, 377, 1869.

[29] Syll. Fung., *2*, 652, 1883.

cases the stroma is more or less separated into patches, sometimes these patches being rather small when they appear as irregular, angular or roughly circular disciform bodies which suggest a resemblance to the stromata of Balansia, but differ in the absence of the pseudosclerotium, and especially in the fact that the well developed stroma of Balansia between the bases of the perithecia and the host is lacking.

As stated above in 1894 I proposed the genus Dothicloë for those species of Hypocrella Sacc. which are congeneric with *Hypocrea atramentosa* B. & C. Hypocrella[30] was proposed by Saccardo for forms like *Hypocrea discoidea* B. & Br. and *H. atramentosa* B. & C., having asci and spores like Epichloë but the stroma of which does not entirely surround the host.

Hypocrea discoidea and the first species given by Saccardo in the Sylloge under the genus[31] *Hypocrella phyllogena* (Mont.) Speg., in my opinion are not congeneric with *Hypocrea atramentosa* B. & C., *H. discoidea* being thick, discoid and scarlet in color, *H. Phyllogena* being thick, tubercular or discoid (the thickness equalling or exceeding the diameter) and whitish in color, according to specimens which I have seen in the Herbarium of the Museum of Paris; while *H. atramentosa* is thin, effuse and black. *Hypocrea atramentosa* may be regarded by some as belonging in the genus Epichloë, but because of its black stroma in my opinion it is not congeneric with Epichloë, though it is closely related and should be retained in the Hypocreales just as Balansia and Claviceps are, because the perithecial walls while not very distinct are still of a different structure from the tissue of the stroma, although Saccardo (l. c.) placed forms of *H. atramentosa*, example "*Dothidea atramentaria*" B. & C. in the Dothidiaceae, and in 1894 I considered the species as belonging to the Dothideaceae. The genus Dothichloë represents a transition of the Sphaeriales to the Dothideales. While I formerly mistook, as stated above, specimens of *Hypocrea atramentosa* B. & C., which were distributed in various Exsiccatae as *Hypocrea hypoxylon* (Pk.) for "authentic" specimens of Peck's *Epichloe hypoxylon*, the diagnosis of the genus Dothichloë was drawn from fresh specimens of *Hypocrea atramentosa* on leaves of Andropogon from Alabama, and of another species on stems of Aristida also from Alabama. The specimens on leaves of Andropogon have since been compared by me with the type specimens of *Hypocrea atramentosa* B. & C. at Kew and have been found to be identical. It will be sufficient therefore to make the necessary correction in the name *Dothichloe atramentosa* (B. & C.) Atkinson, in place of *Dothichloe hypoxylon* (Pk.) Atkinson, and in the synonymy citations. It may be well, therefore, in order to make matters clear to repeat here the diag-

[30] Michelia, *1*, 322, 1878.
[31] Syll. Fung., *2*, 579, 1883.

nosis of the genus and of the two species as published in 1894 [32], and to correct the synonymy, with such slight changes as may now seem necessary.

DOTHICHLOE Atkinson, Bull. Torr. Bot. Club, *21*,*223*, 1894.

Stroma thin, hard when dry, black, especially the outer portions, lighter within, but the dark color is present to a considerable depth, effuse, pulvinate, disciform or armillae-form, partly or entirely surrounding the host or substratum, continuous or interrupted and then a thin sterile portion continuous as in *D. aristidae*, but then not developed to an appreciable extent between the bases of the perithecia and the host. Perithecia crowded, confluent with the stroma, but thin walls distinct and of a different structure from the surrounding stroma, immersed, the apex projecting above and giving the stroma a granulose, rugose or convolute appearance. Asci cylindrical, 8-spored. Spores filiform, septate when mature, and eventually separating at the septa into short segments.

DOTHICHLOE ATRAMENTOS (B. & C.) Atkinson, Pl. 85, and Pl. 88, Figs. 25-27.
Hypocrea atramentosa B. & C., Jour. Linn. Soc., *10*, 377, 1869, Grev., *4*, 15, 1875. Royal Herb., Kew. "No. 419 Fungi Cubenses, Wright." "No. 4018 on Andropogon, Alabama, Beaumont."
Dothidea vorax B. & C., p.p. Grev., *4*, 105, 1876.
Dothidea atramentaria B. & C., Grev., *4*, 105, 1876.
Hypocrella atramentosa Sacc., Mich., *1*, 323, 1878. Syll. Fung., *2*, 581, 1883.
?Ophiodothis vorax var. atramentaria Sacc. Syll. Fung., *2*, 652, 1883.
?Dothidea atramentaria Rav. Fung. Am., No. 100.
?Dothidea atramentaria Ellis & Everhart N. A. F., No. 683.
Hypocrella hypoxylon Ellis, p.p. N. A. Pyren., 91, 1892.
Hypocrella hypoxylon E. & E. N. A. F., No. 2373.
DOTHICHLOE HYPOXYLON Atkinson p.p. (name only) Bull. Torr. Bot. Club, *21*,*223*, 1894. Some Fungi from Alabama, Bull. Cornell Univ. Science, *3*, 19, 1897.

Stroma 5-20 mm. long (or sometimes longer), usually occupying one side of the leaf and may be either epiphyllous or hypophyllous. Perithecia 100-150 μ in diameter and nearly twice as long, the conical apices projecting slightly above the stroma give it a granulose appearance. Asci 150-200 x 4-5 μ, linear, tapering to a slender point at the base and crowned by a hyaline truncate apex or cap "cell." Spores nearly the same length as the asci, but about 1 μ in diameter, curved and interwoven in the ascus.

[32] Bull. Torr. Bot. Club, *21*, 223, 224, 1894.

This species is very common on grasses in the Southern States, especially on Andropogon in Alabama and probably in nearby States (Andropogon virginicus, Eragrostis tenuis and Eragrostis campestris; Auburn, Alabama). On Panicum agrostoides (No. 2373 E. & E. N. A. F.) Jackson, Miss., on grass, Irby, Ga., Tracy; Cocoanut Grove, Florida, Thaxter. The specimens which I have seen of "*D. atramentaria*" Rav. Fung. Am. No. 100, Ellis & Everh. N. A. F. No. 683 have a very thin stroma. They either represent depauperate forms, or a different species, probably the former. Cultures and studies of development are needed to settle this point. In some cases I have found the stroma of this species, *Dothichloe atramentosa,* so situated on the underside of the leaves of a single plant as to indicate that in the young stage both of the host and parasite the young stroma entirely surrounded the cluster of leaves before they had elongated. As the leaves elongate some elongate more than others, tear apart this common young stroma and we then find it situated on the under side of all the leaves of that cluster, but separated as shown in Plate 88, Fig. 25. It will be remembered that one of the important characters of the genus Hypocrella as given by Saccardo (l. c.) was the unilateral position of the stroma in contradistinction to the enveloping character of the stroma of Epichloe. Where the stroma is effuse as it is in *Dothichloe atramentosa* and related species the host has more influence in determining its partial or complete envelopment. In this species the fungus may begin its development with the position on the host ascribed to one genus, but is finally cast in the character of another genus by the growth and unequal elongation of members of the host. This together with the fact that in *Dothichloe aristidae,* a closely related species, the stroma normally surrounds the stem of the host, lessens the value of the unilateral position of the effuse stroma as a generic character. On the other hand the peculiar deep and restricted character of the stromatic bodies of *Hypocrella phyllogena* (Mont.) Speg. and *Hypocrea discoidea* (B. & Br.) Sacc. of itself limits the extent of the stroma without regard to the host. This together with the difference in color, texture, etc., well separates these species genericaly from a plant of the type of *Hypocrea atramentosa.* Hypocrella Sacc. might well be retained for *H. phyllogena, H. discoidea* and other congeneric species.

DOTHICHLOE ARISTIDAE Atkinson [33]. Pl. 88, Figs. 28, 29. Stroma dimorphic, sterile portion confluent, forming a thin black layer, in the specimens seen entirely surrounding the culm. Fertile portion much thicker, confluent or interrupted, forming small perpendicular elevations on the sterile portion, but not forming distinct stromata as in Balansia since it is always thin beneath the bases of the perithecia as in *D. atramentosa.* Projecting apices

[33] Bull. Torr. Bot. Club, *21*, 224, 1894.

of the crowded perithecia more or less confluent in an irregular manner giving a tuberculose, rugulose or convolute appearance to the stroma and more prominent than in *D. atramentosa,* otherwise as in *D. atramentosa.* On Aristida purpurascens, Auburn, Alabama, collected by B. M. Duggar. On Aristida dichotoma, Auburn, Alabama, C. L. Newman. On grass which resembles Aristida, at Cocoanut Grove, Florida, Dr. Thaxter collected specimens which probably belong to this species, but the perithecia are old and sterile in the specimens which I have seen.

The simple agreement in character of the asci and spores of these species cannot be taken as of specific identity where there are other characters sufficiently distinct, for there is no appreciable difference between the asci and spores of *Epichloe typhina* and those of *Dothichloe atramentosa*, and in several species of Cordyceps they are very similar.

While I have found the perithecia bearing stroma only on the stems, the leaves of affected plants often show a very thin black sterile stroma. Whether this sterile stroma on the leaves is formed by the same fungus or not I cannot say. It would seem that it should bear perithecia if it is specifically identical with *Dothichloe atramentosa.* But since the stroma only fruits on the stems (provided the sterile stroma on the leaves belongs to the same fungus) this would be another indication of its being a distinct species.

ECONOMIC IMPORTANCE OF THE SPECIES.

Aside from the very interesting feature in the morphology of the species of these two genera, and the interesting and intricate history of their synonymy, they are of special interest in relation to their hosts because of their possible economic importance. So far as we knew they are strictly parasites. The species of the genera at present knewn are intrinsically parasites of the grasses, and all the species with which I am at present familiar in the United States attack living grasses. Because of the great importance of the grasses for pasturage and forage any fungus which is capable of causing disease or injury to members of this order at once becomes of considerable economic importance, even though at present the percentage of injury which they cause is small. We do not know at what moment a change may occur which may favor the more rapid multiplication of the parasite and the susceptibility of the host, as well as the spread of the parasite to some of the grasses which are now of greater economic importance than those which at present constitute the hosts of the parasite. This change to other hosts could very well take place by the evolution of some biologic form especially organized to successfully overcome the new host. The primary attack could be made through a vulnerable point due to physiological conditions of the

host, or to some accidental injury. Having once obtained a foothold in the new host there would be a chance of its adaptation to the new environment and the acquirement of new biological properties which would enable it to attack other individuals of the same host, just is it is possible now, by artificial means to transplant one biologic form of a parasite from its normal non-resistant host over to another host which under ordinary conditions is immune or not susceptible to this biologic form[34].

The development of new varieties of grasses as well as the tests of feral species which are now being carried on by the United States Department of Agriculture for the purpose of selecting those species which are suitable for cultivation, and also the cultivation of these or old varieties under new conditions of environment or with more intensive methods of cultivation or seletion may play an important part in opening the way for the propagation, distribution and increasing adaptation of these fungi so that their injuries may be greatly increased. Some such course, or phase of evolution as outlined here probably has marked the history of most of the fungi parasitic on domesticated plants and accounts in a measure for the sudden outbreaks of biologic forms on hosts formerly immune, of the sudden appearance of a parasite in greatly increased virulence of attack which formerly produced very limited injury, or of the migration of parasitic fungi from ferel plants to domesticated ones where in the new and often more favorable environment the disease caused by it does great injury and becomes a permanent menace to the successful cultivation of the host.

Balansia hypoxylon has been found on Danthonia spicata in the Northern United States and in Nova Scotia and probably occurs sparingly throughout the normal distribution of this host. That it occurs on other species of grasses is shown in its collection by Long in Texas on an undetermined species of grass, which however is not Danthonia spicata, and possibly it is the same species of grass on which was collected the conidial stage, Ephelis mexicana in Mexico, and it also occurs on a grass in South Carolina as shown above. The fungi on these hosts are probably one species and are so treated in the present paper. This indicates that the fungus may in the future be found on other hosts or even may spread to new ones. Whether the forms on the dif-

[34] See Salmon, E. S., Cultural Experiments with Biologic Forms of the Erysiphaceae, Ann. Bot., *18*, 320, 321, 1904. Proc. Roy. Soc., *73*, 116-118, 1903. Proc. B. A. A. S. Southport meeting, 1903. On specialization in Parasitism in the Erysiphaceae. Beihefte 2, Bot. Centralb., *14*, Heft 3, 261-315, pl. 18, 1903.

Cultural experiments with the Barley Mildew, Erysiphe graminis D. C., Ann. Myc., *2*, 70-79, 1904. The New Phytologist, *3*, 109-121, 1904. Ann. Myc., *3*, 172-184, 1905. On Erysiphe graminis D. C., and its adaptive parasitism within the genus Bromus, Ann. Myc., *2*, 255-267, 307-343, 1904.

ferent hosts are biologic forms or not, or whether the form in Texas is a different species can only be determined by cultural work. At any rate they are very closely related and have without question descended from one and the same species. So that whether in the future it shall be shown that these are but one species viable on several hosts or whether there are biologic forms or biologic species with considerable fixity confined to distinct species of host, does not militate against the possibility of a still further extension in the range of hosts or the virulence of their attack. So far as we know at present the Banansia hypoxylon attacks only the fruiting spike and causes abortion of the same so that seeds are not developed. Affected plants, therefore, are not productive and should the fungus ever become very prevalent and common it would seriously interfere with the normal means of propagation of the host species.

The species of Dothlichloë are much more common, are abundant and widely distributed in the Southern United States and rare in the Northern United States. Dothichloë atramentosa especially is common on Andropogon and other grasses. While strictly parasitic so far as we know it is more viable on different hosts than Balansia hypoxylon, though it must be borne in mind that the same problem of biologic forms holds good here which in this case also can only be settled by future investigation. This species as limited here attacks only the leaves, but seems to be tardy in development so that the leaves are often well formed. Whether plants affected by this parasite ever form seed or not I have not observed, but in many cases the attack as I have seen it does not seem to be sufficiently severe to prevent the development of the axis and of mature seed.

Dothichloë aristidae attacks the stems which it surrounds and injures to such an extent that, so far as I have observed no spikes or at least no seeds are formed.

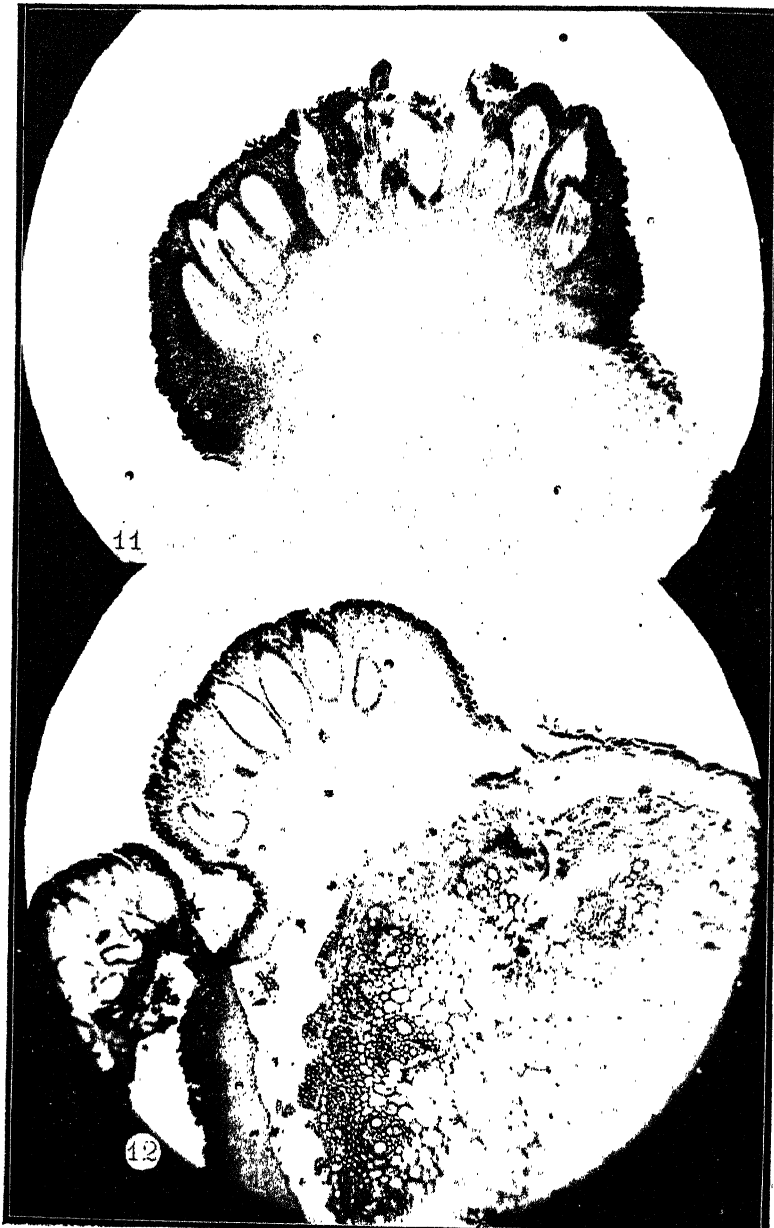
During the coming season, or at any future time, I should be very glad to receive in abundance or in small quantity specimens of these or other related species in a fresh condition with a sufficient portion of the host for photographing and for identification.

I wish to acknowledge my obligations to Dr. T. Dyer, director of the Royal Herbarium at Kew, Mr. Massee of the same Herbarium, Mr. Hariot of the Herbarium of the Musée d'historire Naturelle at Paris, Dr. P. Hennings, of the Berlin Museum, and Dr. Britton, director of the New York Botanical Garden, for courtesies shown in allowing me to examine the herbarium specimens; to Dr. K. Miyaka and Dr. Charles E. Lewis, formerly graduate students and assistants in the Department of Botany at Cornell University for sectioning the material of Balansia hypoxylon and Dothichloë atramentosa; and to Dr. Thaxter of Harvard University and Professor Kellerman of Ohio State University for contributing specimens from their herbaria;

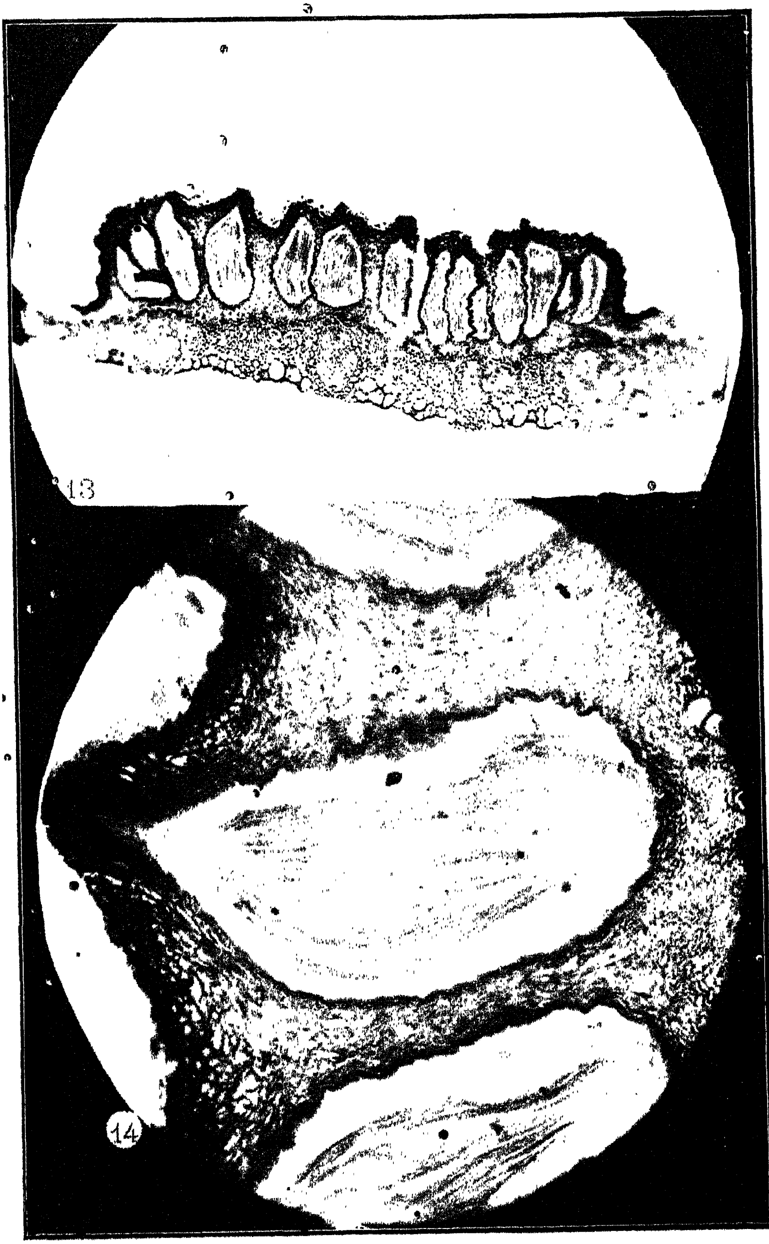
BALANSIA HYPOXYLON (PK.) ATKINSON.

BALANSIA HYPOXYLON (PK.) ATKINSON.

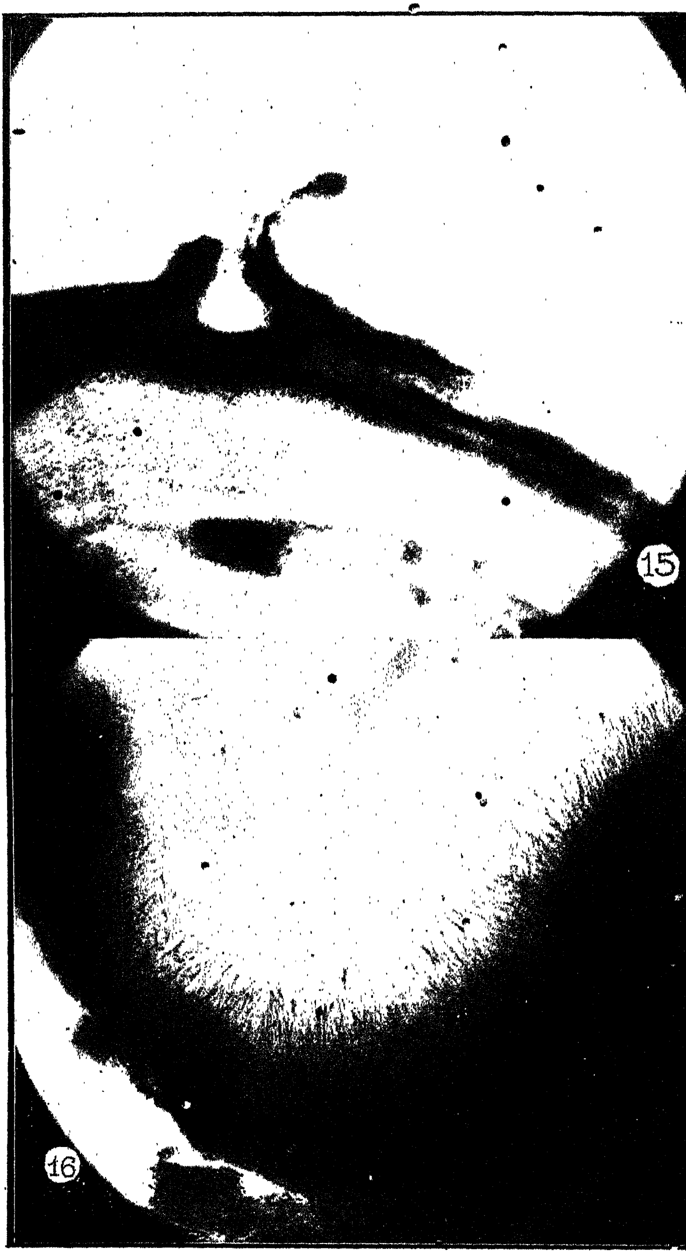
BALANSIA HYPOXYLON (PK.) ATKINSON.



BALANSIA VORAX (B. and C.) ATKINSON.

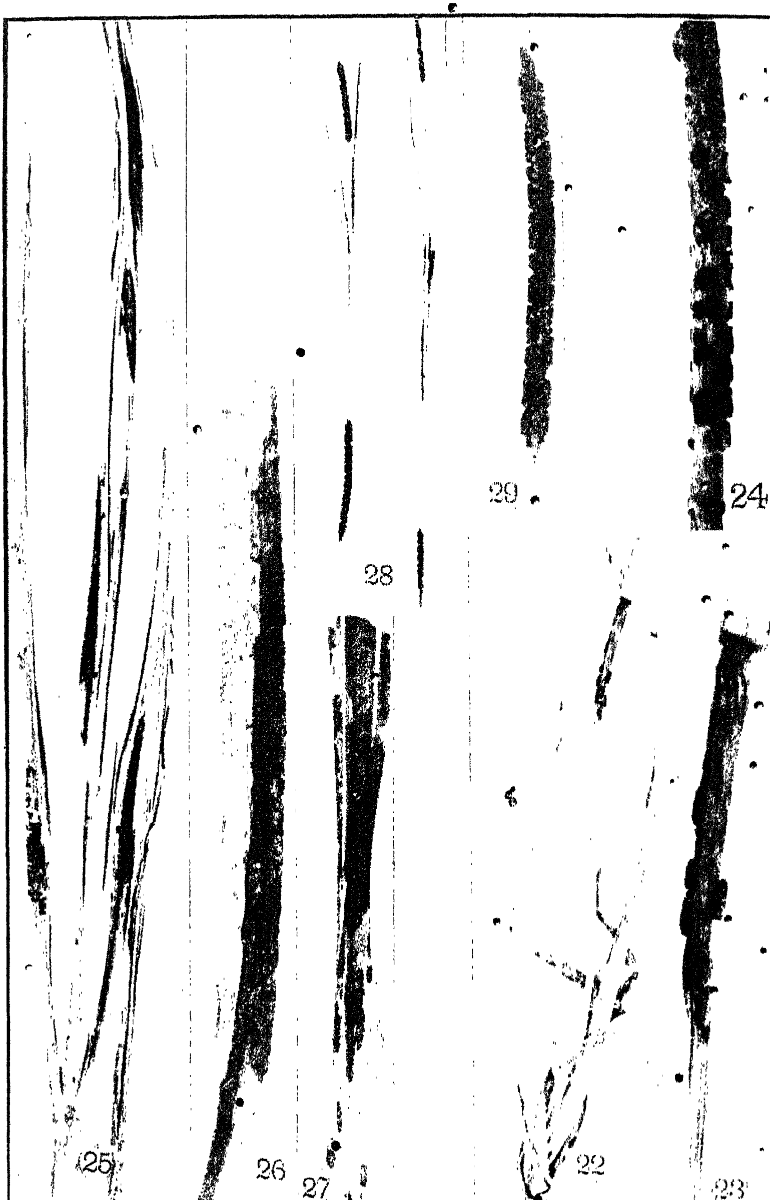


DOTHICHLOE ATRAMENTOSA (B. and C.) ATKINSON.



BALANSIA HYPOXYLON (PK.) ATKINSON.

BALANSIA HYPOXYLON (PK.) ATKINSON.



BALANSIA DISCOIDEA P. HENNINGS.

and to my collegue, Dr. E. J. Durand, for saving me some time by assisting me with some of the references.

EXPLANATION OF PLATES.

The photographs and photomicrographs were made by the author.

The photomicrographs were made with aid of a Zeiss microscope.

Plate 81. Balansia hypoxylon (Pk.) Atkinson.

Figs. 1-3 on grass from Texas. Fig. 1, pseudosclerotium with stromata magnified about five times the real length and diameter. Fig. 2, section of pseudosclerotium and two stromata on opposite sides showing deformed stem, leaf and floral elements in center of pseudosclerotium, and the perithecia near surface of the stromata, still more highly magnified. Fig. 3, ascus with spores. Drawn by K. Miyaké.

Figs. 4-6 on Danthonia spicata from Ohio. Fig. 4, pseudosclerotium with stromata magnified about five times the real length and width. Fig. 5, section of pseudosclerotium and one stroma, showing stem and leaf elements, etc., in the pseudosclerotium, and the perithecia near surface, still more highly magnified. Fig. 6, ascus with spores. Drawn by K. Miyaké.

Plate 82. Balansia hypoxylon (Pk.) Atkinson, on inflorescence of Danthonia spicata, Ohio.

Fig. 7 showing section through a stroma showing perithecia with asci, and a very small portion of the pseudosclerotium. Fig. 8, a perithecium in the stroma more highly magnified showing wall, ostiolum and asci with ascospores. Fig. 7, photomicrograph with ocular 6, objective 16 mm., the plate holder being 360 mm. from the object. Fig. 8, photomicrograph with ocular 6, and objective 3 mm., the plate holder being 360 mm. from the object.

Plate 83. Balansia hypoxylon (Pk.) Atkinson, on inflorescence of grass, Texas.

Fig. 9, section of stroma with asci and part of pseudosclerotium.

Fig. 10, perithecium in stroma more highly magnified, showing wall, ostiolum and young asci.

Fig. 9, photomicrograph with ocular 6 and objective 16 mm., the plate holder being 360 mm. from the object.

Fig. 10, photomicrograph with ocular 6 and objective 3 mm., the plate holder being 360 mm. from the object.

Plate 84. Fig. 11, Balansia vorax (B. & C.) Atkinson, from type material of Dothidea vorax B. & C. from Khasia, India, in Royal Herbarium at Kew. Section of a stroma or fruit body showing perithecia. Photomicrograph with ocular 6, objective 16 mm., the plate holder being 360 mm. from the object.

Fig. 12, Balansia discoidea P. Hennings, on stem of Andropogon, Kansas, marked "Dothidea vorax B. & C." in Ellis Herbarium now in Herbarium New York Botanical Garden. Showing section of a stroma or fruit body and a portion of stem with enveloping sterile stroma or pseudosclerotium. Photomicrograph with ocular 6 and objective 16 mm., the plate holder being 360 mm. from the object.

Plate 85. Dothichloë atramentosa (B. & C.) Atkinson, part of type of Hypocrea atramentosa B. & C., in Royal Herbarium at Kew "No. 4018 on Andropogon, Alabama, Beaumont."

Fig. 13, section through the general stroma and leaf showing perithecia.

Fig. 14, perithecium of same, more highly magnified showing wall, ostiolum and asci with spores.

Fig. 13, photomicrograph with ocular 6 and objective 16 mm., the plate holder being 360 mm. from the object.

Fig. 14, photomicrograph with ocular 6 and objective 3 mm., the plate holder being 360 mm. from the object.

Plate 86. Balansia hypoxylon (Pk.) Atkinson. Ephelis stage, Ephelis borealis E. & E.

Fig. 15, free hand section through peziza-like fruit body and portion of pseudosclerotium.

Fig. 16, angle in cup of same more highly magnified showing the very slender spores.

Fig. 15, photomicrograph with ocular 6, objective 16 mm., the plate holder being 360 mm. from the object.

Fig. 16, photomicrograph with ocular 6, objective 3 mm., the plate holder being 360 mm. from the object.

Plate 87. Figs. 17 & 18. Balansia hypoxylon (Pk.) Atkinson.

Fig. 17, photograph of Danthonia spicata showing pseudosclerotium with the rounded stromata at *a*, real size. Note much smaller size of the pseudosclerotium and much larger size of the stromata than in B. vorax fig. 19.

Fig. 18, the Ephelis stage (Ephelis borealis E. & E.) enlarged about six times the real length, showing pseudosclerotium with peziza-like fruit bodies, from free hand sketch.

Figs. 19 and 20, Balansia vorax (B. & C.) Atkinson.

Fig. 19, photograph, real size, of type specimen from Khasia, India, now in Royal Herbarium at Kew, England, the large pseudosclerotium in inflorescence at *a*.

Fig. 20, small portion of the pseudosclerotium with stromata magnified about ten times the real length and width, from free hand sketch.

Fig. 21, Balansia claviceps Speg., photograph real size, of portion of specimen from Royal Herbarium, Kew, on stem of Panicum, Paraguay. Note that many of the stromata are sessile.

Plate 88. Figs. 22 and 23. Balansia discoidea P. Hennings, on stem of Chloris distichophylla, Brazil.

Fig. 22, real size, pseudosclerotium and stromata at *a*.

Fig. 23, same magnified 3 times real length and width.

Fig. 24, Balansia discoidea P. Hennings, on stem of Andropogon, Kansas, magnified 3 times the real length.

Figs. 25-27, Dothichloë atraemntosa (B. & C.) Atkinson.

Fig. 25, photograph, real size, of Andropogon plant from Alabama showing black effuse stromata on under side of the leaves. This plant indicates that when the host and fungus were young the young stroma entirely surrounded the cluster of leaves, but when the leaves elongated they tore the enveloping stroma apart.

Fig. 26, a single stroma on under side of a leaf magnified 3 times the real length and width.

Fig. 27, photograph magnified 3 times the real length and width of very thin stroma on leaf of grass, of No. 683 E. & E. N. A. F. This is the same form as occurs in Rav. F. C. Ex. No. 100 which usually bears the name "Dothidea atramentaria B. & C." See text for discussion.

Figs. 28, 29, Dothichloë aristidae Atkinson, on stems of Aristida purpurascens, Alabama.

Fig. 28, real size.

Fig. 29, magnified three times the real length and width. Note that the perithecia are larger and much more prominent in Fig. 29 than in Fig. 20 where they do not show because not so prominent.

ANOTHER FLY AGARIC.

D. R. SUMSTINE.

Amanita muscaria is called the fly agaric because infusions of it are poisonous to flies. It has now, however, a keen rival for this reputation in another species of the same genus. Last summer while drying specimens of *Amanita olitaria Bull*, a number of flies were attracted to them. After the flies had remained on the plants for a short time they fell over apparently dead. This continued until thirty-nine fly mycophagists had become the victims of some narcotic contained in the mushrooms. The box with flies and plants was then set aside for future study. After two hours the box was again examined, but the flies which once were dead were now alive and had departed with no more serious results possibly than a severe headache from their mycological "booze."

Several experiments were made with other specimens of the same species and the same results were obtained. It seems that this plant has some property that acts as an intoxicant or soporific to flies. It is reported by some writers as edible and by others as poisonous..

Wilkinsburg, Pa.

NOTES ON UREDINEAE. IV.

E. D. W. HOLWAY.

PUCCINIA UNIFORMIS Pammel & Hume.

An examination of the type specimen of this species showed that the host was not Rumex pauciflorus, but Polygonum, and the fungus does not differ in any way from Puccinia Bistortae (Sta.) DC.

PUCCINIA OBLICUS B. & C.

This species was said to be upon some plant resembling "chick-weed;" specimens examined were too small to determine the host plant, but the Puccinia seems to differ in no way from Puccinia lateritia B. & C. and the host is no doubt one of the Rubiaceae.

UROMYCES OBLONGA Vize.

This was published as found on "Burr Clover." An examination of a specimen in the Herbarium of Dr. Farlow, probably sent by Harkness, disclosed that it was on Trifolium and identical with Uromyces minor Schroeter. As the name used by Vize is older, it must be adopted for this plant.

PUCCINIA FRAGILIS Tracy & Gall.

The specimens of this species in Baker, Tracy & Earle, Plants of So. Col. 423a, prove to be Puccinia plumbaria Peck, and the host is a Phlox, perhaps Phlox longifolia. I have examined the type, which is also on Phlox.

PUCCINIA PURPUSII P. Henn.

This was reported as being on Arabis, but is Puccinia plumbaria Peck, on some Phlox, or closely allied genus.

PUCCINIA ARABICOLA E. & E.

The type specimen of this is a fragment of a leaf, but the fungus differs in no way from the Eastern U. S. form of Puccinia plumbaria which is found on Phlox divaricata.

REMARKABLE OCCURRENCE OF MORCHELLA ESCULENTA (L.) PERS.

W. C. STURGIS.

During a recent hunting trip in southwestern British Columbia the writer came across this fungus growing in such abundance and in a location and at a season of the year so unusual that the circumstances seem worth recording. Usually one expects to find *Morchella* in the Spring growing on the borders of meadows or other grassy places. In the present instance the plants were found in September on a steep mountain side which had, within a little over a year, been subjected to a destructive forest fire.

On September 11th the writer was skirting the precipitous side of a mountain at an altitude of about 7,000 feet, and while passing through what had been a fairly good growth of aspens and small spruces, a few fine specimens of *Morchella* were noticed. Further search revealed the presence of these plants literally in hundreds. A fire had passed across the mountain in June, 1904, leaving only skeletons of the trees standing and charring the ground to such a depth that no trace of green vegetation had since appeared. Yet under these unfavorable circumstances and at a season when snow had already fallen not far from the locality, a bushel of *Morchellas* might have been gathered within a radius of one hundred yards. The specimens were exceptionally fine, in some cases attaining a height of seven inches and a circumference around the pileus of ten inches. In such specimens the pileus usually showed a great variety of form, from conical and flattened to nearly spherical. In other cases the pileus more nearly resembled that of *M. conica* Pers. The base of the stipe was in all cases much swollen and consisted of a mass of mycelium and soil cemented into a sclerotoid mass. Specimens were secured from which the identity of the fungus was later determined.

The interesting question arises whether, on the western slopes of the Rocky mountains, *Morchella* usually occurs in the Autumn rather than in the Spring, as elsewhere, and also how the presence of the particular specimens is to be accounted for. It is hardly possible that the spores could have been carried to the locality in sufficient quantity to have produced in one season so large a growth of plants, and it is almost equally inconceivable that a subterranean mycelium could have resisted a degree of heat sufficient to destroy permanently all surface vegetation and leave the ground a desolate waste of charred clay.

Colorado Springs. November 13th, 1905.

ROSTOVTSEV, S. I. CONTRIBUTIONS TO THE KNOWLEDGE OF THE FALSE MILDEWS (PERONOSPORACEAE.)

Bulletin of the Moscow Agricultural Institute, 1903.
Part 1. 24 pp., 20 figures.[1] (Russian.)

A REVIEW BY ERNST A. BESSEY.

In October, 1902, the author received specimens of cucumber leaves from Tver government, which were found to be suffering with a form of what has been known as *Peronospora cubensis.* He reviews some of the literature of this species and points out that of the two species parasitic on *Cucurbitaceae*, *Plasmopara australis* is a typical *Plasmopara*, both as regards conidiophore and germination of conidia, and differs from *P. cubensis.* The latter possesses conidiophores like *Peronospora.* The conidia, however, have an apical papilla and germinate sometimes with the production of zoospores, thus showing the characters of *Plasmopara.* He proposes to found for this species a new genus to be known as *Pseudoperonospora* with the one species *P. cubensis.* The chief characteristics of this genus are possession of a conidiophore like *Peronosport* and conidia like *Plasmopara.* The Russian fungus he distinguishes from the typical species as the variety *Twericnsis.* The differences lie in the appearance of the spots and more especially in the fact that in the former the conidiophores are single, in the latter, two to six together.[2] The author finds that the conidia are borne on very slender, very short stalks separating them from the ends of the conidiophores. These same pedicels occur also in various species of *Peronospora*, *Plasmopara*, *Bremia*, *Phytophthora* and *Cystopora* studied by the author. They remain unstained by iodin and sulfuric acid or by chloriodid of zinc, while the conidia and conidiophore are stained blue. These pedicels dissolve in water, setting the conidia free. Germination of the conidia occurs sometimes by germ tubes, sometimes by the formation of zoospores.

Immature oospores are found in old dead leaves late in the autumn.

A few months latter the author published in Germany[1] a similar article giving again the description of this fungus and

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[1] The work is entitled in Russian: Rostovtsev, S. I. Materiali k poznaniu lozhnomutchnerosnykh gribov (Peronosporaceae). Otdyel'nye ottiski iz "Izvyestii Moskovskavo Syel'skokhozya-istvennavo Instituta" kn. 1 zo 1903 god.

[2] See below for further discussion of this proposed variety.

[1] Rostowzew, S. G. Beiträge zur Kenntnis der Peronosporeen. Flora oder Allgemeine Botanische Zeitung, 92[4]. 405–430. 1 fig. pl. 11–13. Oct. 1903.

proposing again the new genus *Pseudoperonospora*. This will naturally be the publication to be cited, for the description in the article just reviewed was entirely in Russian. Clinton[2] with, it seems, not sufficient ground for the action, refuses to recognize this name and raises to generic rank the subgenus *Peronoplasmopara*, created by Berlese[3] for this fungus. Although it is to be regretted that Rostovtsev did not accept this subgeneric name and raise it to generic rank, there is no nomenclatorial law making a generic name invalid in case the subgeneric name is ignored, so that the name *Pseudoperonospora* will have to stand. Clinton points out, with evident correctness, that the differences upon which the variety *Tweriensis* was based occur also in America, depending upon the age and host of the fungus, so that this variety can not be considered as valid.

It is of great interest that Rostovtsev finds that the disease has been present in Russia from time immemorial, the effects being recognized (drying of leaves, and early death of the vine) but the cause being unknown until 1902.

U. S. Department of Agriculture.

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[2] Clinton, G. P. Downy Mildew, or Blight, *Peronoplasmopara cubensis* (B. & C.), Clint., of Musk Melons and Cucumbers. Report of the Conn. Agr. Expt. Sta. for 1904. Part IV. Report of the Station Botanist: 329–362, pl. 29–31. 1904.

[3] Berlese, A. N. Saggio di une Monografia delle Peronosporaceae. Revista di Patologia Vegetale. 9:1-124. 1902.

NOTES FROM MYCOLOGICAL LITERATURE XVII.

W. A. KELLERMAN.

THE MYCOLOGICAL ARTICLES IN ANNALES MYCOLOGICI, Vol. II, No. 5, September 1904, are as follows: Holway, E. W. D., Mexican Uredineae; Bubák, Prof. Dr. Fr., Neue oder kritische Pilze; Rick, J., Ueber einige auf Bambusarten wachsende tropische Hypocreaceen; Rick, Fungi austro-americani exs. Fasc, I; Cavara, Fr., A propos d'une remarque de Mr. le Dr. Franz v. Höhnel; Petri, L., Sul valore diagnostico del capillizio nel genere "Tylostoma" Pers.; Salmon, Ernest S., On the identity of Ovulariopsis Patouillard & Hariot with the conidial stage of Phyllactinia Lev.

ZEITSCHRIFT FUER PFLANZENKRANKHEITEN, XIV BAND, 1904, contains the following which mycologists will find of interest, namely, C. G. Björkenheim, Beiträge zur Kenntnis des Pilzes in den Wurzelanschwellungen von Alnus incana (hierzu Tafel

III); P. Hennings, Verschiedenartige Pilze auf Blättern kultivierter Rhododendron Falconeri Hook. f.; K. S. Iwanoff, Ueber Trichothecium roseum Link, als Ursache der Bitterfäule von Früchten (mit Abbildung); H. Klebahn, Ueber die Botrytiskrankheit der Tulpen (hierzu Tafel II); R. Laubert, Eine wichtige Gloeosporium-Krankheit der Linden (hierzu Tafel VI); Linhart, Die Peronospora-recte Pseudoperonospora-Krankheit der Melonen und Gurken in Ungarn.

A SYNOPSIS OF THE PILEATE SPECIES, is William Alphonso Murrill's XI contribution to The Polyporaceae of North America (Bull. Torr. Bot. Club, 32:353-371, July 1905). Here, as in some of the preceding installments of the series, a free pen forges many new genera as the following list shows: Coriolopsis, Flaviporus, Cerrenella, Nigroporus, Fomitella, Amauroderma, Porodaedalea. The family *Polyporaceae* is concisely diagnosed; the synopsis shows three sub-families, viz., Polyporeae (*hymenium porose, hymenophore annual*); Fomiteae (*hymenium porose, hymenophore perennial*); *Agaricaceae* (*hymenium furrowed*). Synopses (keys) are given of the genera under these three heads, also of the species under each genus.

E. W. D. HOLWAY PUBLISHED TEN NEW SPECIES under the title of Mexican Uredineae, in Annales Mycologici, September 1904. Seven are species of Puccinia, one Aecidium, and two Uromyces. Ipomoea, species mostly not determined, are hosts to five of the Puccinias. Cuphea, Rhus and Ruellia are the hosts for the other new species.

THE MYCOLOGICAL ARTICLES OF TAXONOMIC INTEREST in Zeitschrift für Pflanzenkrankheiten, XII Band, 1902, are the following: Ed. Fischer, Aecidium elatinum Alb. et Schw., der Urheber des Weisstannen-Hexenbesens und seine Uredo- und Teleutosporenform. Zwefte Mitteilung; Geo. G. Hedgcock and Haven Metcalf, Eine durch Bakterien verursachte Zuckerrübenkrankheit; B. Hennings, Zwei neue parasitische Blattpilze auf Laubhölzern, Der Stachelbeer-Mehltau (Sphaerotheca mors-uvae [Schw.] Berk. et C.) in Russland, Beobachtungen über das versciedene Auftreten von Cronartium ribicola Detr. auf verschiedenen Ribes-Arten, Uber die weitere Verbreitung des Stachelbeer-Mehltaues in Russland; H. Klebahn, Kulturversuche mit Rostpilzen, X. Bericht (1901), Die Perithecienformen des Phleospora Ulmi und des Gloeosporium nervisequum (Vorläufige Mitteilung); G. Linhart, Die Ausbreitung des Stengelbrenners am Rotklee; Konst. Malkoff, Notiz über einige in Göttingen beobachtete Pflanzenkrankheiten.

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INDEX TO HOSTS.

Journal of Mycology, Vol. II, pp. 233-280, Issued Nov. 29, 1905.